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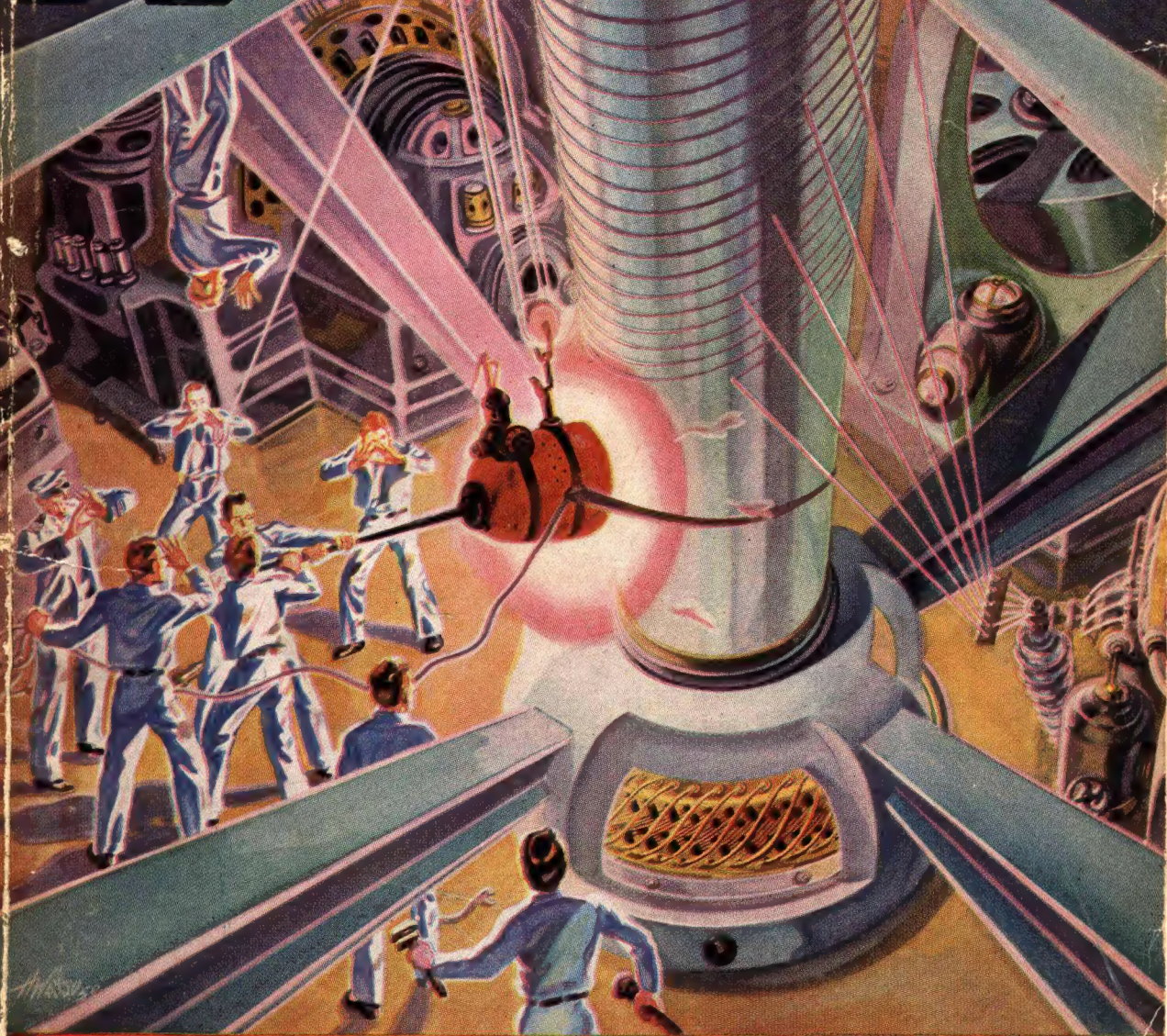
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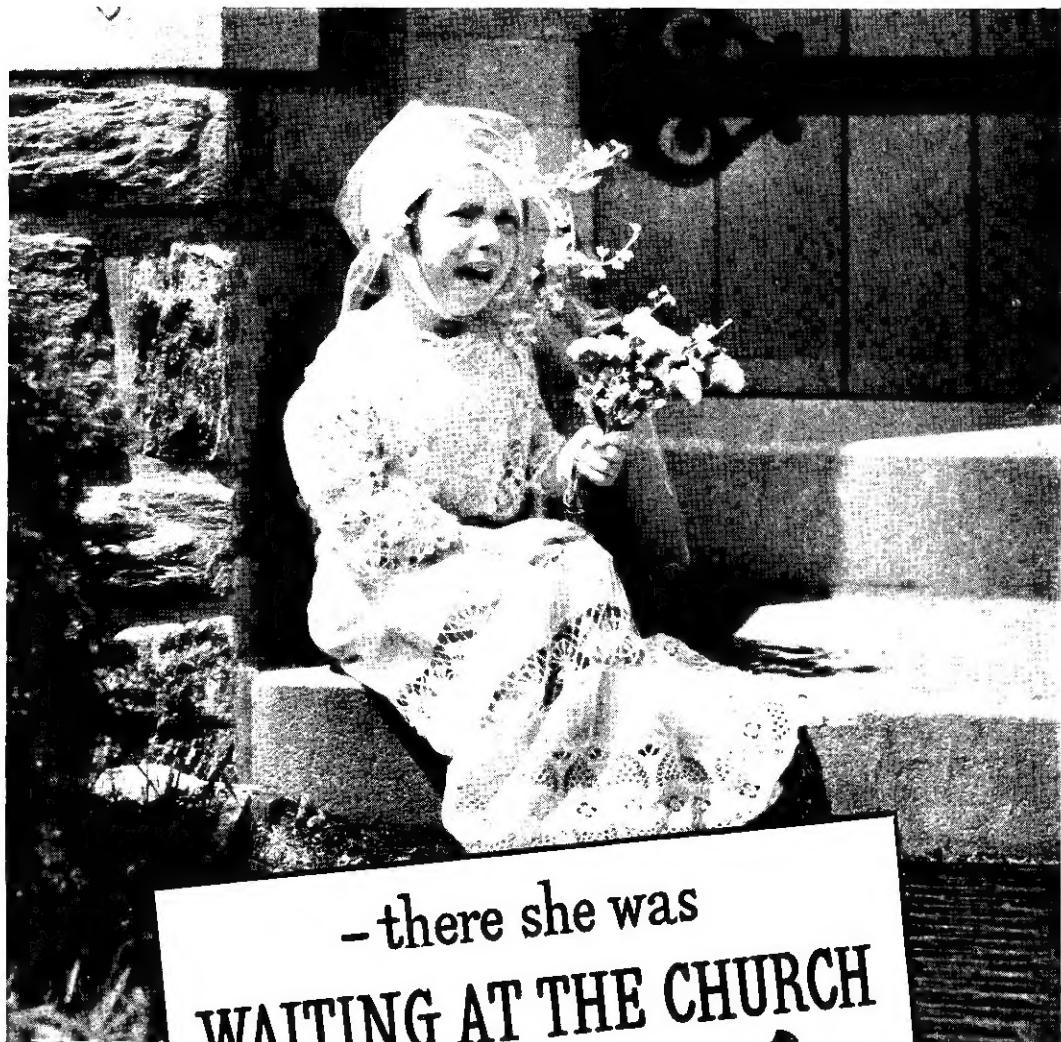
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Volume XXI

Number 6

AUGUST, 1938

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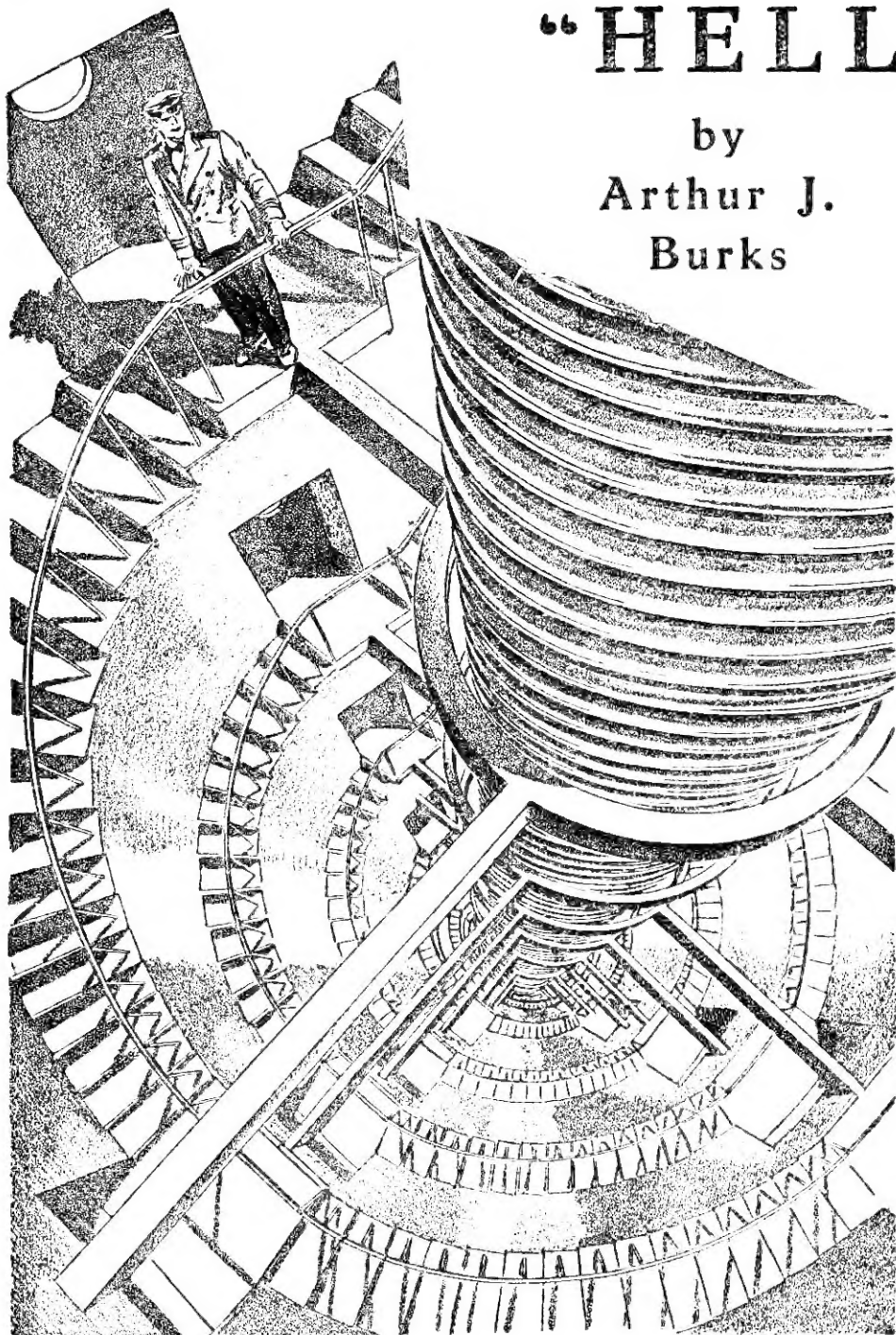
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"HELL

by
Arthur J.
Burks



Chief Engineer McNab looked down the Tunnel, the engineroom of the ship, and was content. It was spotless.

SHIP"

Wherein Josh McNab, good Scots Engineer of the Spaceship Arachne, finds himself up against a cracked drive-rotor and a bull-headed Skipper.

CHIEF Engineer Josh McNab made the change from stratosphere planes to the S. S. *Arachne* without turning a hair. He was a man for progress, was McNab. Other old-timers had shrugged their shoulders and turned up their noses back when the *Arachne* was first lowered into her slip preparatory to her maiden voyage. Josh had consoled himself with the thought that it had always been thus. Grizzled oldsters had always said that old and tried things were the best—that nothing new would last. Their attitude suited McNab, who followed his own star, never overlooking a chance to increase his pay and position.

So, five years before, he'd signed on as Chief Engineer of the *Arachne*. And he had never had a doubt until this moment—though even in his doubt he knew the answer. He'd told the skipper that the rotor shaft was beginning to crack. And the skipper, to be sure, had passed the report along to grasping old fuss-budget Martin Caperton, who owned the *Arachne*, first of a fleet that had grown to two hundred in five years—all money-makers.

There was a slightly ironical twist in the fact, now, that the *Arachne*, first of the spider fleet, was the oldest of that fleet, and that some of the oldsters who'd laughed at McNab were now members of crews of the modern streamline jobs, and inclined to look down their noses at McNab because he preferred to stick to the safe, sane, though rather lumbering *Arachne*. She was due now to speed along her regular force-lane to Mars in a matter of minutes, yet Josh had heard

nothing of a lay-over for repairs. But that was quite in line with Caperton policies, too.

"An' there be scuts that say the Scotch are teet!" he muttered. His Scotch dialect was broad enough to cut with a knife when he was aroused, or talking to himself.

If repairs were to be made in the slip, Caperton had to pay union wages plus time and a half for overtime. If they were made enroute—sailors had to do it, and they received no extra pay. Then, it was "for the safety of the ship", and plain duty. Moreover they *had* to do it if they got home again. "An' weel yon Caperton kens it!" muttered Josh McNab.

Personally, McNab didn't care much one way or the other. The *Arachne* was as much his home as his tiny apartment room, where he lived frugally and alone and saved his money against a rainy day. But he knew what "gravity fever" did to human beings who might, just possibly, have to spend more time together, cooped up on the *Arachne*, than they had bargained for—and without weight, if the main-shaft went. But they, like the sailors and marines—the Caperton fleet was government subsidized, in part, and semi-military in character—had to stand by because they wouldn't be able to do anything else. It was like being at sea. Passengers didn't jump overboard and start swimming for shore just because their ship had to heave-to for a few hours in mid-ocean and make repairs.

But on the *Arachne* it *could* be nasty. Josh, however, had done his duty with

his usual exactness. The rest was up to Skipper Lee Parsons and Martin Caperton—the latter a pot-bellied old owl in shell-rim spectacles. If no stop-order came through, the *Arachne* would get under weigh on schedule.

"Ye're the purrtiest thing," said Josh, looking the *Arachne* over from the rim of the slip, his gray eyes glistening with pride. "Purtier than the bonniest lassie that ever coom oot o' Scutland, save one! If only I had the money to own ye!"

He sighed, for he knew that a Chief Engineer's pay, even when he saved it all, would never get him to first base in such a purchase. He ran a gnarled, oil-grimed finger across a section of one of the magnesium-beryl hull plates of the *Arachne*. To Josh it was like touching the skin of one's best beloved—though Josh had almost forgotten just what that was like. There had been a wife once—Mary—but that had been long and long ago. After she died—Josh had been twenty-five then—he'd never looked at another woman as a man might, though any woman named Mary had a kind of claim on his heartstrings. McNab was now fifty. He got his enjoyment from watching the stars in the eyes of sweethearts and newlyweds who took trips, honeymoon and vacation, on the *Arachne*. It was almost like being young and having your own wife again.

HE WENT INTO the hull through a door that opened at his touch and fell behind him without sound. Lord, but she worked pretty. Never a thing to rasp on the nerves of a touchy old buzzard like Josh McNab—who couldn't stand the screech of unlubricated hinges, nor the sound of metal against metal.

The *Arachne* was perfect—except for the infinitesimal crack in the rotor shaft. Might take a little time for its effect to be noticed, for it was of thirty-inch chrome-moly steel, and might even stand up until the *Arachne* eased back into her

slip on the return voyage. But sooner or later it would go. Caperton knew it, and had, doubtless, already figured out just how to save that time and a half for overtime. Well, that's how a man like Caperton got rich, he supposed.

A leatherneck sentry saluted respectfully. Josh paused and asked him how his kids were, and the young chap's face lighted like a harvest moon.

"Fine, sir, just fine. And by the time we get back, if we keep to schedule, there'll be another one. We're expecting and praying for a girl, this time."

That gave Josh a sort of pang, for the one thing he regretted out of a long, active life was that he had no children. The one that had taken his wife had gone away with her, and it was a sad thing to remember. But the *Arachne* somehow took the place of both—the *Arachne* and her passengers.

The crew was already at stations. The marines were at their sentry posts for the outward voyage. Josh wasn't sure he liked marines. They were a little on the bossy side, and they unbuttoned the collars of their tunics when their officers weren't around. Still, when you had to have order, and maybe had to keep it by force, they did all right. But the sailors, now, they were the lads. You always knew right where you stood with them.

McNab, informed that Skipper Parsons hadn't come aboard yet, made a round of inspection. Not that he needed to—not even in the Tunnel, which was his own special stamping ground, where his black gang enjoyed a tradition of precision in their work. But there was satisfaction beyond words to express in going over the whole ship anyhow—seeing, feeling, almost tasting, the delights of the *Arachne*. It was almost a ritual with him, to start from his own quarters, in the top section of the Tunnel, just under the top main thrust bearing, beyond which was the wart on the hull that was the control bridge. It was

a grand thing to stand in his own door and smell, and listen, before beginning the ritualistic descent through the heart of his kingdom.

Just outside McNab's quarters the huge magnesio-beryl girders were a tracery of complex web-work, distributing the thrust of the monster main shaft. That web-work *talked* to Josh McNab in confidential whispers as it strained to its work—telling him how things were going, and whether he was correctly doing his job. The whispers were so real to Josh that sometimes he caught himself saying: "So, is that right the noo?"

He got his bearings now from the crew's quarters, in the topmost rounds of the hull, where the rooms were many shaped, and intersected by the same thrust-spreading girders. Those girders, whispering, lulled his own tired men to sleep. The whole crew seemed, to Josh, like spiders in the girder web.

THE TUNNEL ran the length, aloft and below, of the *Arachne*—almost the full two hundred and seventy-five feet of her. Just to inspect it made Josh feel that he was the heart of the sturdy old spaceship. Seldom indeed did he use the swift elevators that paralleled the shaft, for what could you see from elevators? Nothing at all! But the circular staircase leading down—that was something different. It circled the Tunnel, and kept you so close to the smell and the sound of the main-line helix that you felt—if you were Josh McNab—like you were a surgeon examining a patient with painstaking care. There was always the bite of oil in the nostrils, perfume to the soul of a Scotch engineer. And then there were the clankings of the perfectly fitting parts of the helix and its operating sister—of course the ship was a "she"—the motor's rotor, wound on the same shaft because of centrifugal stresses.

McNab started below. The sound of

his footfalls on the steps would let his crew know he was enroute—not that it mattered especially, as he wasn't the kind to sneak up on honest, hard-working men—for it went winging down the Tunnel as though he had shouted he were coming. He took a white glove from his pocket, thrust his hand into it. It was spotless. Grinning, as though sure of the result, he closed the gloved hand on the rail of the staircase, polished like a mirror, and clung as he walked down. After ten steps or so he stopped, looked at the glove, and his chest swelled a little. The glove was still spotless. His lads kept things ship-shape, sure enough. But, just to make sure they hadn't cleaned the rail for his benefit for the first ten feet or so, he slid his hand along the rail for ten feet more. Then he took off the glove, still stainless, put it into his pocket.

A complete picture of the ship was in his head, but even so, every trip was a voyage of discovery, every step through her a delight. A great sphere, she was, two hundred and fifty feet in diameter amidships, at the belt. He liked best to think of her when the helicopter tugs were warping her in to a landing—swallows about a mighty hawk. Ten thousand tons of dependable spaceship. Though he couldn't see through the walls of the Tunnel as he descended, he knew where he was every second of the descent.

Level under level, below the crew's quarters, the passengers' quarters, by classes—based, as always, on price paid for tickets and service furnished—to the first-class quarters, which gave directly onto the mid-section, by gentle stairs, which housed the belt promenade—with its transparent plastic windows—the main lounge, bar, dining saloon and social quarters.

McNab liked to visit the mid-section to watch passengers come aboard.

Remembering that now, as he passed the midships level, he hurried a bit, to

get back in time, though he never slighted an inspection. In the lower third of the ships were the cargo levels, where stowing must be such that the center of gravity was below the gravitational line helix, so the ship would hang straight. Down there, too, were the accumulators—storing electric power for emergencies—and the atom converters whose endless humming was music in the ears of McNab, as much a part of him as the little tufts of gray hair that thrust forth from those same ears. Oxygen and water tanks were down there, too, the air apparatus, all the auxiliary functions, the D. C. motor—forty thousand horse power!—series wound, capable of revving up to 35,000.

He checked the accumulators and the atom converters, and kissed his fingertips to them, looked around guiltily to make sure nobody had caught him at it. "I could e'en kiss 'em i' fact," he told himself.

Then, remembering again, he hurried back up the stairs, again disdaining the elevators, trying to forget how the main or gravitational line helix—which crawled like a snake around the rotor shaft—almost always got him down. It worked miracles, and he wasn't too sure of himself in the presence of miracles. There was something almost weird and unearthly about the helix.

II.

HE PAUSED before reaching the bulkhead that gave on the belt promenade, and looked at his watch. Fifteen minutes to go and everything ready. Skipper Parsons would be aboard shortly. The passengers, by this time, would be arriving by bus. The bus allowed few minutes' leeway, so that passengers wouldn't have to stand around and fidget.

"Carry on," said Josh to his crew, many of whom were perched at various strategic places along the Tunnel, on

the stairs, to watch every movement of the rotor shaft. "I'm going out to the promenade to watch the passengers come aboard."

The crew hadn't even looked at him as he made his inspection. Now, though, one or two of them grinned at him. All knew his weakness for watching pretty girls and their sweethearts, newlyweds, old men, old women—the latter usually jittery until they found that a voyage on the *Arachne* was probably safer than sitting at home in their own rocking chairs. He stepped now into the middle of the belt promenade, which circled the Tunnel shaft, stopped, straightened up and looked as military as possible.

Ah, but the girls were lovely. Stars in the eyes of every one of them. Hair done just so. Light summery dresses suggesting the right holiday mood. Men in knickers, bareheaded, maybe a few reckless ones with suspicious bulges to their hip pockets where their flasks rested. The *Arachne's* bar was sometimes expensive for people who'd calculated their pennies carefully for the trip.

Josh cast a weather eye at the ports, against which some of the young couples were standing, looking out and down, enjoying the thrill of trying to look around the bulge of the *Arachne* to the ground, nearly a hundred and forty feet below. The sight always gave Josh a slight pang of memory—of his days on the steamer lanes, when passengers just like these had stood on covered hurricane decks, their faces flushed with excitement, their eyes alight at first sight of blue water, their legs spread against the first rolling caused by increasing depths. The change had been slight, after all. *Then*, they went out and away. *Now* they went up and away.

"Hi, Uncle Josh!" said a clear voice. Mary Purdy came sailing around the promenade so fast her hair blew free. She spent most of her money and all her vacations on the *Arachne*. She was

young, lovely, and Josh adored her secretly. Besides, like that other one, her name was Mary. She could have had all Josh's lifetime's savings merely by saying so—when Josh would have protested loudly, grimly and stubbornly, had he been called upon to spend any part of them to save his own life. She grinned at him, showing twin rows of fine white teeth, and fully conscious of what she did to Josh McNab.

"Hello, Mary. Why dinna ye murry ain o' th' crew an' live aboard th' *Ahr-rahknah*?"

She laughed. "Excuse me, Uncle Josh, but I like to hear you speak the name of the ship. I know you love it so, but the way you sling it out with your Scotch burr—which I love with all my heart, Uncle Josh!—it sounds like a fighting word! And as for marrying, you're the only one aboard I'd marry, and you shy off from me as though you were a burned child, I the stove."

"I'm auld enoo, Mury"—his brogue got thicker with confusion, and Mary frowned as she listened, but drank it in with delight, hard as it was at times to catch—"to have barns yer age. But o' course, if ye were richt seerious—"

"There is a joker, Uncle Josh."

"Dinna tell me!"

"You're *not* my father, and I'm half serious about it. If you really set out to take me by storm I'd fling myself into your arms so hard I'd knock you over—solid like a rock though you are!"

HIS GRAY EYES went wide. Mary Purdy sounded serious enough to puzzle him vastly—and to make his face suddenly turn brick red. Mary laughed at his blushes. If he were younger—and she *really* meant it! But there, he was forgetting there had once been another Mary, whose memory he still loved. He couldn't seem to find an answer to her direct frankness, and stumbled around verbally, seeking a way out—though he'd have died there, of bash-

fulness, before he'd have gone away from Mary Purdy. Finally he brought forth some words that would do.

"A grrand boonch o' passengers, this time, Murrly," he said, his eyes roving over the lines of folks trooping aboard. Some swung instantly to the promenade, starting to walk around and around, almost running, as though afraid from the very start that something would happen somewhere around the spherical hull that they would miss. Some headed straight for the bar, and drinks. Some headed for the lounge and social halls—and more drinks. Some would stick to bridge tables from the starting time until they arrived at journey's end. Funny about people, that way. Took a trip to Mars as a matter of course. Didn't even look up from their cards when the *Arachne* turned on its "web", a million miles from its destination, and began to lower away. Nothing fazed them.

But if that rotor shaft cracked—

He shut it from his mind, thinking of Mary, wondering whether he shouldn't tell her about it—and decided not to. There wouldn't be much danger, even if it cracked, and thought of Mary aboard filled him with such delight that he took a chance. She'd be tagging him everywhere he went, and he'd be liking it, answering questions shot at him with machine-gun rapidity. Mary already knew as much about the ship as Skipper Parsons. She'd even been allowed on the control bridge during some recent trips, but Josh was her favorite. If she hadn't remembered everything he told her he'd have thought she made him talk just to listen to—and sometimes mimic—his brogue.

Mary was talking, though, and he gave her every attention. "There you go," she said, "changing the subject as always. Uncle Josh, for being the soul and spirit of a proud old beauty like the *Arachne*, you're the 'fraidest man I ever saw."

"I fear naught," said Josh, "yet there

be summat aboot wimmin called 'Murry' that makes even the calloused heart of an auld Scutchman go gallivantin'. Best sit ye doon, Murry. The Skipper cooms sharlty an' we start when he's aboard an' the *Ara*—the *Ara*——"

Mary's grin began to widen. She listened carefully, leaning forward on tip-toes, not to miss the slightest inflection of Josh McNab's voice when he spoke the name of the *Arachne*.

"Th' feerst o' th' spider fleet!" he said triumphantly.

"Come, Uncle Josh, say it for Mary!"

"The *Ahrrahknah*," he said promptly, and she didn't laugh at him, and he knew that she wouldn't even think of it if she thought he were the slightest bit sensitive about his brogue.

"Look like a nice voyage this time?" she pursued.

"O' coourse! The *Ahrrahknah* speeds along her force-lane like a rat along a rafter, a spider along her web."

"And John McNab running her!"

"Skipper Parsons runs her!"

"Yes, but without Uncle Josh, where?"

JOSH McNAB reflected a moment. "Wcel, noo, he's no a Scutchman, nor yet a Chief Engineer, nor has he the name o' Murry, but for a' that an' a' that——"

"He's a nice figure of a man, Uncle Josh, and you're so loyal to him you could bust."

She came closer to him suddenly, grabbed him by the ears, pulled his head down and gave him a smack on the lips from which he was destined never to recover. Then she stood back, grinned at him.

"You'll never have me, I know," she said softly, "so I have to do the best I can. He's aboard, Uncle Josh."

"Young Islip?" McNab scowled suddenly.

"Yes."

"With anither woman!"

"Yes. But it's my fault, and he's punishing me -I hope! We split in a quarrel last week. But *she* is never going to have him, Uncle Josh!"

He stared into her determined eyes, suddenly much concerned, feeling any hurt she may have felt—or he even suspected she might feel—as a hurt to himself. Now, slowly, he shook his head.

"She willna have him, Murry, if ye wush to keep him. Aye, I ken it in yer c'en! Like a Scutch lassie ye ne'er gie oop yer ain!"

"There may be an emergency or—something, Uncle Josh, out in space somewhere. Then he'll turn to the one he really wants, and if it isn't me I'll never bother him again. I'll just lie down and die, or force you to take me."

Josh went brick red again. Mary laughed, then stopped laughing suddenly, pretending not to notice young Jack Islip—a redheaded hellion, Josh thought him, with a streak of recklessness in him that might be dangerous in years to come, to somebody, some woman—walking blithely past with a fluttery female on his arm whom Josh disliked at once. He stared at them, not noting when Mary Purdy, to avoid notice, slipped into the lounge.

Josh McNab, watching the chiseling female, decided that Mary could give her aces and spades and beat her from Earth to Procyon hands down. But was Jack Islip worth it? Mary might think so, but if Mary got hurt at all, over this young redhead—— Well, Josh would take a hand. He might even take a hand anyhow. Certainly she—by giving her confidence—had offered him the chance, almost begged him to take it. But what could an old engineer do? Still, an emergency—such as might be brought about by a rotor shaft beginning to crack. . . .

He shook his head. What in the devil was he thinking about, just because a lovely girl's name was Mary?

SKIPPER PARSONS came out of one of the elevator doors, his gaze roaming over the promenade. McNab knew that Parsons had come hunting him, knowing where to find him. He also knew that Parsons wanted to show off his new uniform, that fitted his trim figure so perfectly.

"Right on time, McNab. Everything set?" said Parsons.

"Aye, sir, a' is richt, savin' the matter o' rreporrt——"

"The rotor shaft will hold," said Parsons, as though his saying so would make it hold. His gaze followed the promenading passengers, and Parsons now indulged in a bit of harmless showing off that never failed to amuse McNab. He walked to the inter-level address system, whence his voice reached every part of the ship, including—*especially* including—every part of it where passengers would be at the moment of starting.

"Stations all!" called Parsons, standing very straight, apparently unconscious now that promenaders had ceased promenading and were watching and listening. "Three seconds to go!"

There was almost no perceptible movement, save that the knees of some of the passengers bent, and even McNab stiffened his legs against the drag. The low, smooth whine of the great rotor and gravitational-line helix built up as the *Arachne* moved out of her slip, swifter and smoother than greased lightning—looking, McNab knew, like a mighty balloon that had broken free and was headed for heaven with nothing to hold her back.

The start was never tough, for near any planet the gravitational lines of force were so close together that it was a cinch. And the *Arachne*, riding her own particular lane, feeding the lines of force through her helix, transversing the Tunnel, was really like a spider speeding along her web.

"Bonnie! Bonnie!" whispered Josh

McNab. "Bonnie as a lassie from th' hielands!"

He crossed the promenade to the ports, automatically adopting the rolling walk of the sailor that he could never lose, really, because he had spent his early years on salt water. He looked out, sort of checking his location in space. The Earth was already a ball, far below the *Arachne*. The lines of force, as the *Arachne* "climbed", would draw farther and farther apart, and the motor's revs would climb to compensate. In no time she would be doing her 35,000 rpm's. And when that time came Josh McNab's place was in the Tunnel. He turned back, regarding the passengers—again promenading—with something like envy. He stepped into the Tunnel to watch the behavior of the rotor shaft—after taking one swift glance into the lounge to see what had become of Mary Purdy. He didn't see her. But he did see that the rotor shaft was to be a real concern. Without the slightest doubt, it would not complete the Martian journey without being repaired.

And to repair the rotor, a million miles from nowhere—— Well, that might be more of an emergency than even Mary Purdy dared ask for.

III.

STILL, for two days the *Arachne* sped on her way. Josh McNab seldom slept, save in catnaps. He was up and down the circular "ladder" a dozen times an hour, seemingly tireless for all his years. He was listening to the voice of the Tunnel, the murmuring of the helix, the talking of the metal parts of the whole motor assembly. It was typical of him that even in the growing tension, the waiting for something to happen, he occasionally took out the white glove and tested the shining brass of the rail.

And now and again Mary Purdy came to him, suddenly, from one level

or the other, as though she always knew where he was, and appeared when she needed his company. He knew things were not going well with her, and there was even a time or two, when she stood on the circular stairs, hands gripping the rail until her knuckles were white, that he was a little afraid she might fall, by "accident". Then he cast the thought from him as unworthy. Mary Purdy—nor any other girl named Mary—would die the coward's way.

But she was eating her heart out, and there was little he could do. He couldn't even go and kick young Islip in the teeth, just for luck. Because he had to stick to the Tunnel, and young Islip avoided the ship's interior, probably because that frippery female with him couldn't stand the bite of oil, or the sight of laboring men not too fully clad, keeping vigil with Josh McNab. Not Mary, though; she was a real man's woman. The crew knew it, and brightened and grinned at her when she appeared, and seemed to gain strength from her presence.

Then, when things were pretty bad for Mary, by the looks of her, and she stood on a landing with McNab, in the Tunnel ahead of the belt promenade: "Murry," he said softly, dropping his calloused hand over hers—which took a lot of courage for Josh McNab, "is you laddie worth it?"

"To me, Josh, yes."

She swayed, and would have fallen, and Josh had an inspiration.

"Tell me, Murry, the noo, about the ship. Answers nicht help a wee bit ye ken——"

She understood instantly, and turned her head toward him for a moment, without relaxing her grip on the rail. She did, however, lean her body a bit away from the cylindrical pit of the rotor.

"Top and main thrust bearings, Josh," she said, "are oil pad flotation surfaces, with 22 square feet area, operating with an oil pressure of 350 pounds per square inch. The metal of the bearing-plates

is cadmium bronze. The main rotor ball-caps are chome-moly-vanadium steel; the shaft itself a 30" chrome-moly heat-treated alloy——"

The *Arachne*, after all, was one of her passions, and her own words did a lot to help her back to herself.

"The hull plates are of magnesium-beryl—— Thanks, Josh. I needed that, I guess. I'll try my best to stop being silly. If he doesn't care, I'm foolish to bother, even though it hurts inside. But you wouldn't know, Josh ——"

"Her name was Murrry, too, lang an' lang ago," said McNab slowly.

"Oh, Josh, I didn't think——"

"So mony folk, Murrry, dinna think at all! But dinna ye fret——"

JOSH McNAB'S life, as he saw it, had changed but little since he had first gone to sea in almost the last of the surface ships on Earth. When they'd gone the way of all obsolete man-made things, he'd stepped into the stratosphere. Then out of stratosphere ships—which lasted such a short time—into the *Arachne* and the regular Earth-Mars run. Like clockwork it had been, for five years. Vast space instead of vast oceans of salt water. So many things that were the same.

The decks were circular, a grand promenade—at least amidships. They got smaller as you went aloft or below. At sea they'd been sort of oblong, and there you could hear the swish of the sea against the hull, feel the heeling of the ship as monster waves struck it broadside or quartering. At sea you could see the proof of a roaring storm. In the *Arachne* you couldn't see much, and there wasn't much swaying about, or back and forth, thanks to the stabilizing gyroscopes. Walking the decks was like walking any other decks, when a ship was tied up at the dock, or "like a painted ship upon a painted ocean".

"Uncle Josh," said Mary, turning her hand in his, and clutching his gnarled

fist with a sudden, fierce pressure, "why do women have to be so doggoned weak and silly over a redheaded creature in trousers?"

"Weel, Murrly —" he began, and got no further.

Mary heard it, too, or sensed it. With the crew swinging into swift movement she could not miss it. The voice of the Tunnel had changed. Maybe there was a different kind of whisper in the girders alow and aloft. Maybe there was something differently metallic in the stealthy slither of the brushes on the rotor slip-rings. Maybe the *schuffing* of the helix had changed.

But true sailormen knew the very smell of danger.

"Josh," whispered Mary, "what is it?"

"Git ye back to th' promenade, Murrly," said Josh, his face grim. "There may be danger here, an' if aught happened ye —"

"Danger?"

He stared at her. She wasn't frightened. Indeed he saw a flare of hope in her eyes, and knew she hadn't forgotten her wish for an emergency that *might* bring Jack Islip to her side.

"Really?"

"Back to the promenade, Murrly," said Josh. Mary, with another swift press of her soft warm hand, went. Josh McNab began to bark at his men, stationed up and down the length of the shaft. He yelled for information which he might correlate that would give him the exact location of the sound, and therefore, perhaps, the spot where to look for the break. His men were up and down the stairs, suddenly, like firemen on their pole when an alarm came in. Josh himself moved with amazing speed.

The rotor was going. They might make Mars before it went entirely, but he doubted it. Things sometimes went fast when they started. He stopped on a landing where a chart of progress was shown, and grinned.

At this point in the normal trip a hundred and fifty pound man weighed around twenty pounds, maybe a bit less. But when the motor stopped. . . .

Of course it would have to be stopped now. If anything came apart, at such terrific speed, it would cause a pretty awful mess. Pieces of metal, hurled through the walls of the Tunnel, might conceivably penetrate every compartment, every stateroom on the *Arachne*, killing every person aboard—even Jack Islip and Mary Purdy.

JOSH McNAB took an elevator for the first time since the danger had really begun to develop, and dropped down to the belt promenade. A query over the inter-level address system had informed him that Parsons was in the lounge, talking with an admiring bunch of females. McNab told him he'd rather see him alone, but Parsons said it didn't matter, and he was the ship's master.

So Josh McNab reported to Skipper Parsons in the midst of a flock of people. "The shaft, sirr," he said, and his brogue had never been thicker. He felt his face flushing painfully as the women looked up at him, some with smiles of amusement. He knew from long experience what some of them would do and say when they listened to his brogue. There would be giggles, and he would get confused, and Parsons would think it funny. Parsons was a good skipper, but he was bull-headed and not always bright—even though he did have a ready tongue when it came to gab with the ladies.

Parsons sounded very brave and masculine. "It can't go until we reach Mars!"

"I canna promise, sirrr. If yon auld buzzard, Caperton—"

"Have a care, McNab. Remember your position. It isn't up to you to criticize the owner."

"Aye, sir. I ken that, but the auld buzzard—"

"Stow it, I said! Your job is to run

the motor, keep the *Arachne* going!"

McNab could see that Parsons was expanding in the presence and obvious admiration of the women. Other passengers, hearing, were crowding in to listen. Mary Purdy came and stood close to McNab. Only Jack Islip and that female of his stayed apart from the group.

Mary recognized McNab's distaste for discussion in the presence of so many women. "The rotor?" she asked.

Josh McNab nodded.

"He insists it should be stopped," said Parsons. "And the *Arachne* has held to schedule for five years. Her excellent record must not be broken."

"If Uncle Josh thinks we should stop," said Mary quietly, "it strikes me that even *you* should listen, Captain Parsons."

It was no way to handle Parsons, and McNab knew it. He wished Mary hadn't spoken. It made him feel like a fool, though he loved her anew for standing up to Parsons. Not many people dared do that, even women, when he was setting out to be authoritative. He rose now, with half the passengers trailing him, close on the heels of McNab and Mary, and stopped at the bulkhead where he kept a chart, properly marked every six hours for the benefit of the passengers. He touched the chart with a blunt forefinger.

"We're about halfway, McNab," he said, almost as though he were teaching the alphabet to an incorrigible kindergarten child. "Right where the lines of force are most widely separated. If we stop now, we drift out of them entirely—into the doldrums, speeding on for Heaven knows where. I don't care to risk it."

He turned back to McNab. "Drive her, McNab," he said grimly. "We can beat the break to our port."

"Aye, sir, but——"

"Orders, McNab. I said to drive her!"

McNab touched his forelock. He'd served with too many skippers—including this one—to even suggest disobeying orders, or being slow in obeying them. He turned away. The thing left to do was stick to the Tunnel for the better part of two more days, and sort of pray the rotor to safety. Prayers were all right, McNab knew, but spanners, and the right kind of heat were also good for a break in the rotor.

Parsons was blundering again. He shouldn't have said anything in front of the passengers, and now he was going even further, when it wasn't really necessary. It was one thing to kill people, or take chances with their lives, and quite another to tell them what to expect. Parsons spoke over the inter-level address system.

"Ladies and gentlemen," he said, "there is no real danger, of course. But our rotor shaft may go at any moment. We're driving at full speed for the nearest Martian port. Just don't lose your heads, and we'll be all right——"

Mary understood, too, that Parsons was bulling ahead, making blunders that might prove costly. Her hand gripped McNab's arm tightly. He patted that hand with his own. It was grand for a man's strength to have someone who stood by through all sorts of weather. Parsons was going on, managing now to sound pompous.

"Just remember the tradition of Caperton lines—five years on schedule without loss of life or a ship. Settle back and be comfortable, and we'll get you through!"

A vast, ominous stillness seemed to settle over the whole ship when Parsons had finished. He wasn't the first to realize, but it startled him. Maybe he had expected shouts of encouragement, or belief in his prowess. If so, the sudden silence must have bothered him considerably, or what happened in the next few moments would never have happened. In that taut silence the sounds



Gravity gone, the ship's officers were helping passengers "down" from the ceiling, teaching them to maneuver—

came from the Tunnel to the promenade, and thence—since Parsons had left open the public-address microphone—to every nook and cranny of the *Arachne*. The sound was the shuddering of the rotor, the *schuffing* indecision that had sent McNab hurrying to see the captain.

Faces turned toward the doors that masked the Tunnel. Eyes widened with dawning terror. The circular tube in the middle of the *Arachne* had become, on the instant, the abode of death perhaps, certainly the abode of a ghastly threat.

A marine officer barked: "Everybody keep your heads now!" And to his men, before Parsons could say anything, head him off, "See that there is no running about, no panic!"

Fear was a poor weapon with which to avert catastrophe. And Parsons didn't help much when he drew himself up and said quietly: "My place now is on the control bridge. McNab!"

"Aye, sirr!"

"Drive her!"

"Aye, sirrrr!"

With long manly strides Parsons made for the nearest elevator, entered, closed the door. McNab, able to hear the voice of his beloved Tunnel and its metal monsters from the promenade, hesitated, watching the passengers uneasily. He didn't like the growing whiteness in so many faces.

IV.

"I MIGHT HAVE known you'd get me into trouble! Why did I ever come on this trip anyhow? We're all as good as dead!"

Jack Islip's girl— McNab strode to her, enroute to the Tunnel. "That isna true, lass," he said quietly, staring her straight in the eye, for the first time in years unabashed by a woman.

"What do you know about it, you old billygoat?"

"Mind your business, McNab," said

Islip, his face red as he stood close to the girl. "Mind your own business or I'll knock your teeth down your throat! You can't talk to my girl like that."

"Then see that th' lass doesna go daft, Jock!"

"Who's daffy?" shrieked the girl. "Trying to quiet me, hey? Because you know I'm right."

"I'll have your job for this, McNab," said young Islip, noting that McNab's lips twisted with contempt.

Mary Purdy still clung to Josh's arm. "Forget it, Uncle Josh," she said. "It doesn't matter. Nobody with any sense will think there is reason for panic, with you running the machines. Personally, I'll follow you anywhere."

"Can the act, Mary Purdy," said the girl. "I'm wise to why you're pulling it, and you won't get to first base."

"It's quite possible I suddenly don't want to," said Mary Purdy. "Come on, Josh, I'm going with you to the Tunnel."

"What do you mean by that, Mary?" asked Jack Islip, bristling.

She chose to misunderstand him. "Only that I'm tagging along with Josh," she said. "Any objections?"

There didn't seem to be any. She clung to Josh's arm as the Chief headed for the entrance to the Tunnel. Josh was as proud as Punch and showed it. Mary was all right. Maybe Jack Islip was, too, for hadn't he stuck up for "his girl"? Right or wrong, there must be something to a fellow who'd do that.

Josh was increasingly conscious of the terror that was growing into a monstrous thing on the *Arachne*. If it broke into action he preferred Mary to be with him. For if the rotor went—at full speed—she would be killed anywhere near the ship anyhow. So *that* wouldn't make any difference.

Every passenger knew his literature of the space-lanes. Ghastly things could happen. A rupture in the hull meant instant death. Becalming of the ship meant eternity spent between worlds.

Becalming until stores were exhausted— Well, there were endless possibilities. And the whole thing could be circumvented by stopping to repair the crack before going on. The Old Man? Well, he was all right. But nobody—certainly no junior on his own ship—could tell him anything, even suggest anything.

Josh and Mary hadn't even reached the door when a middle-aged man screamed. "I'm going to do something! I've studied these rotors and helixes. I know all the answers. We're all going to die if somebody doesn't do something!"

McNab paused, turned. The shouting man was charging toward the door through which McNab himself intended going. He must be stopped. A marine sergeant solved that problem by cracking the frenzied man in the mouth. The fellow went down, hitting the deck with entirely too much force. His head bounced as it struck. The marine rubbed his knuckles. His look said as plainly as words: "Anybody else want some?"

NOBODY could get off the *Arachne*, for its doors were sealed at point of departure and could not be opened until she reached her destination. And even if they could get out, what then? The answer to that question was an appalling one. But in making for any point of fancied safety, there might well be a general pile-up, wherein someone was sure to be killed. A panic-stricken rush into the Tunnel, for instance, might fill the shaft from this level down, with dead. And all because, Josh thought bitterly, old Caperton wanted to save his time-and-a-half for overtime.

Beside him he could feel Mary Purdy's whole body shaking. "The lad," he whispered, "isn't worth your trouble." He meant Islip, who should, he thought, have headed off that silly girl.

"Maybe you're right, Uncle Josh, but

I want him, and nobody else. I love him even more for what just happened. He's being harassed to death, but I'm getting no joy out of it. I'd rather spend eternity out here with him, dead, than five minutes on any planet, with any man alive—except you!"

"Aye, lass," he said softly, turning back as though she had been his skipper and he had just acknowledged an order. "Aye, lass, have him ye shall. But yon rotor, now——"

"Why don't you override Parsons, Josh, and stop the motor yourself?"

Josh stared at her aghast, as though she had committed sacrilege beyond belief. He shook his head.

"Sorry, Josh," she said instantly. "I don't know much about discipline, and being a woman wouldn't take it seriously anyhow. It would be what they call mutiny, wouldn't it?"

Before he could answer, someone screamed, and both turned back again.

"Look out, leatherneck!"

The man who had been knocked unconscious had come around suddenly. He had risen to his feet, grabbed a chair, was rushing on the marine who had slugged him. The marine turned just in time to get a hefty wallop squarely across the skull. But the act of the man the leatherneck had knocked down, focusing on McNab's consciousness with the weird force of a picture done in slow motion, gave him the answer to his own problem, and that of the *Arachne*.

The leatherneck, out on his feet, went down with queer slowness. Other marines flung themselves at the frenzied passengers. And there was stark surprise on their faces, about something they obviously could not understand, but that McNab did understand.

In a split second, while the women crowded against the ports, their mouths opened on screams that promised never to end, marines and men passengers were joined in a battle of fists, knees, and skulls. Blood spattered as fists thud-

ded home. It was a good battle and McNab would have liked to get into it.

But at that moment Skipper Parsons appeared from the first class passenger level. He noticed McNab before he paid much attention to the melee.

"What's the delay, McNab? I told you to drive the *Arachne*. Why are you still hanging around the promenade? Report to your quarters under arrest! I'll have no malingering on the *Arachne* even on the part of the Chief Engineer!"

McNAB STARTED to protest, but decided against it. Instead, this time he went through the door, into the Tunnel, started clumping—not aloft, but below! Yet he had been ordered to his quarters, under arrest, and his quarters were high in the top third of the *Arachne*.

"John," said Mary, "don't be foolish! Your whole career, your whole life can be ruined by one mistake."

He didn't answer, didn't look back. Nor did he order her to get out of the Tunnel, not to tag him along. McNab's mind was more or less one-track. Now that he had made it up, nothing could stop him. Mary's heels rang on the steps behind him. He chuckled as he went, thinking of the feminine sound of those heels.

He went straight to the motor, far down in the bottom third of the *Arachne*. Reaching the motor, he turned on Mary, and smiled thinly.

"Should we gae furrther, Murrry, we'd be in th' bilge, or oot!"

She didn't answer, but stared at him without blinking. She saw in that instant that nothing she or anybody could do would change Josh's mind about what he intended doing. And what he intended doing was simple.

He shut off the motor, and thanked God softly for stabilizing gyroscopes, considering the location of the *Arachne* in space between Earth and Mars. For but for those gyroscopes now, with the motor stopping, and the mighty rotor

soon motionless, the *Arachne* would spin like a monster top. Almost instantly the voice of Parsons sounded in the engine room.

"Who gave you orders to shut down, McNab?"

"Aye, aye, sirr," said McNab, grinning and winking at Mary.

"Are you stark, staring crazy, McNab?"

"Aye, sirr, repairin' richt noo, sirr!"

"I didn't say anything about repairing," roared the skipper. "I said to drive her. Now, with the motor stopped—— Start it again, McNab, do you hear?"

"It isna posceble, sirr," said McNab quietly, and Mary, looking into his dour face, knew that he spoke the truth. "Repairs must be made, sirr."

Not once did McNab vary in the slightest from the strictest forms of spatio-naval discipline. He'd overridden his Captain, but he meant to stick by his guns, and pretend that he had been ordered to cut the motor.

The machinery was already almost motionless. The throbbing of the gyroscopes could be felt, heard. And—"weight", what little there was, died with the failing thrust of the helix. McNab grinned at Mary, and suggested that she return to the belt promenade, to "see the fun".

"Fun?" she repeated. "Fun?"

Josh shrugged, grinned, motioned her up the ladder. Mary, obedient because she saw that Josh meant it, started. But she didn't get far. A look of amazement and momentary terror crossed her face. She couldn't move at all, without pushing hard against the floor. Then, when she had moved, she rose into the air and came down with magical slowness. She put both hands to her heart, and Josh McNab chuckled, waiting for her to get the answer without prompting.

"I get it, Uncle Josh," she said. "At the present moment I weigh exactly nothing. I have attained, therefore, vain

woman's oldest dream, raised to the *n*th degree. All right, I'll go to the promenade to see the fun, but how do I get there?"

Josh McNab answered by example. He simply grasped the rail of the staircase and went up hand over hand, trailing his lean and efficient body behind him. Laughter rang in the Tunnel, and he knew that Mary Purdy was right behind him.

Aloft, along the length of the Tunnel, his men were busy, apparently swimming in space between the staircase and the rotor, preparing the materials needed—without command—for repairing the rotor. Some, below, were breaking out the magnetic shoe clamps for easier movement.

"You're through, McNab," came the voice of Parsons over the inter-level system. "I don't suppose you know that, thanks to you, we're adrift—with no lines of force operating through the helix—in doldrums that, as far as we are concerned, are limitless. But get onto that repair job, McNab. It's all there is left to do. When it's done, you'll carry out the orders I really *did* give you, and confine yourself to your quarters until we return to our Earth slip. Then——"

Parsons didn't finish. He didn't need to. But McNab forgot, next moment, all about it. He was engaged in the amazing and apparently Gargantuan task of "healing" the crack in the rotor. He missed, then, what transpired everywhere else on the *Arachne*. But he didn't mind that, either, knowing that Mary Purdy would give him the facts when both were free again for a session of talk.

V.

WHAT HAPPENED in the belt promenade, and the lounge, and the bar, Mary Purdy told Josh McNab later, in strictest confidence, with many peals of

laughter—only at the time it happened it wasn't by any means a laughing matter. First, Mary—while McNab hand-over-handed it up the staircase, swinging first over the stairs, then over the abyss of the Tunnel—got her hands on the knob of the door leading into the promenade. Then, by exerting unusual strength, in new and untried directions—muscles she'd never used before—she got her feet on deck, pushed the door open, and entered the promenade, closing the door by a weird reversal of the opening process.

Then, holding onto the knob, she stood and looked about her.

Everybody on the promenade looked like people trying to walk under unusually clear water. Even the movement of their hair resembled a weird "dance of the drowned". Jack Islip and his girl were trying to hang onto each other. The girl bent her knees and tried to fling herself into Jack's arms.

Jack reached for her and missed and the young lady sailed up to the ceiling and gave her head a resounding crack. It effectually stopped her screaming, for it knocked her out. Jack reached up and tried to pull her down, and succeeded instead in getting himself off the deck, and couldn't get back down again.

Jack did the natural thing, then; he *swam* around, harkening to the pealing of Mary's laughter—in which none of the other passengers joined. In the eye of her mind, Mary could see passengers in their staterooms, rolling out of bed and not being able to reach the floor, and simply floating about and yelling their heads off. It struck her as very funny. But to them, it was only the frightful sensation of a fall—a fall that went on and on and must end in a frightful smash.

Mary almost offered to help Jack pull the girl down and place her on a divan, but decided against it. Let the little

hussy float! She was surer than ever that this was the proper caper when Jack, turned clear around at last, looked at her with such a glad light in his eyes that her heart turned clear over and then started hammering as though it would suffocate her.

But she stopped laughing, for the rest of the passengers were in a state. Some of them understood, vaguely, some didn't. Some of them thought they were at sea, and that the belt promenade had been flooded—and were both relieved and terrified to find that they could breathe in the strange element in which they swam-walked-floated.

But faces were white as death. Man is born fearing only two things—and one of these is falling. Nobody said anything, probably because nobody believed it possible for them to talk. Mary wondered what would happen if the perpetually partially inebriated tried to drink from bottles, and the liquor wouldn't run out. It would be disappointing, no doubt about that, and certainly conducive to the very latest in delirium tremens. She was glad beyond words that she had asked all sorts of questions of McNab and been patiently answered. Knowing what it was all about she could feel the weirdness of everything without being too frightened at the "falling" sensation.

One thing was certain: McNab had effectually stopped the marines and the passengers from fighting! It would have been worse than trying to fight on the ocean floor at three fathoms!

"Jack!" Mary called.

"Coming, honey," he said. "If some kind spatial spirit will tell me how to get to you—and then will arrange for you to forgive me."

"Let it pass, Jack," she retorted. "Seeing that woman hanging by nothing against the ceiling pleases me more than I can say. It practically balances everything!"

IT DIDN'T help the nerves of the passengers any, or even the marines, when Parsons came, hand under hand, down the rail of the stairs from the first class passenger level, looking very foolish, and with his face beet-red.

"Blast McNab!" he roared. "If I ever return to normalcy, and get my hands on that damn Scotchman! I'll break every bone in his head!"

Mary laughed, and Parsons looked at her, and his face slowly cleared, even as, at the end of the rail, he went through all the queer contortions he deemed necessary to get his body into a position that might be called approximately normal. Magnetic shoes were necessary only to the engineers, and they alone had them. This done, he gave a brief address to such passengers as were within sound of his voice.

"I'm taking every precaution," he choked, "for the safety of the *Arachne*. My Chief Engineer made a stupid blunder in stopping the motor to repair a crack in the rotor. In doing so, he rendered every one of us weightless. It's a queer condition, but quite harmless, if you don't try any broad jumps. If there is any danger at all, between now and the time when the motor is repaired, and we are under weigh for Mars once more, it's because we've slipped our force lane, are out of control, and heading into unknown space. We may fetch up anywhere, or nowhere, depending on how long it takes that blasted McNab to make repairs!"

"Then," said Mary, "our safety is in his hands, isn't that right?"

"Yes, it is. He's the only man aboard with the knowledge to make repairs."

"Then don't you think you might quit belittling him in front of everybody whose lives depend on his efficiency?"

Parsons stared. It took some minutes, but he got it finally, and a sheepish grin started to spread on his face. "You're right, Mary," he said frankly. "I've been stubborn and opinionated.

"I'll admit it now, freely, to everybody, and to McNab when I get a chance."

"And he won't be placed under arrest?"

"No, damn it!"

"I'm going to tell him!" said Mary, forgetting herself and kicking around to open the door, go back into the Tunnel. Fortunately she was hanging onto the knob when she jumped, or she might well have joined Jack Ishp's girl on the ceiling. It scared her, and it scared Jack, a fact which she noted with immense satisfaction when she managed to get back to an even keel, more or less.

Josh McNab and his men were busy repairing the crack in the rotor. Josh estimated that, with luck, the job would be done in eight hours, if everybody worked hard, and didn't lose any tools. The latter possibility wasn't a matter of grave concern, but if a man dropped a spanner it didn't stay where it was, but floated off on its own. That fact was no help, rather a detriment to the troubleshooters. And the reason for no little hilarity. Someone proposed that, as an inducement to passengers in the future, one stop in mid-space should be made on every voyage, to show everybody what it was really like to get "space-legs." Josh hushed everybody, insisting that wasted breath mended no cracked rotors, and the work went on swiftly.

Josh McNab ordered a thermite jacket placed around the area of the crack in the rotor. A mixture of aluminum powder and iron oxide, it glowed with a terrific heat when fired—well into the blue-white, and the metal of the rotor was fused again with a minimum of lost time. This done to Josh's satisfaction, the excess metal was ground off with motor-driven hand-grinders, a detail that took longer, until the rotor at that spot was round again. Then the area was heat-treated with a portable induction furnace strapped around the shaft.

It was a workmanlike job, finished

in jig time. Now and again McNab barked an odor. His men worked with a will, pleased with the way things were going and, frankly, after a while becoming a bit jittery about the matter of weightlessness. They became accustomed to looking down into the depths of the Tunnel without fear, and one man expressed his fear of later consequences aptly. "I'm afraid, sir, that this floating in space may get to be a habit, and that when we get back our weight, we're likely to forget and step right into the shaft, and get ourselves hurt at the bottom!"

Josh, apparently in all seriousness, said that the answer to that was simple. He thereby ordered them, each and severally, never at any time to go down the Tunnel save by the stairs or the elevators, on pain of dire punishment for disobedience of orders. That, he decided, would take care of the situation.

When the job was done, on time almost to the minute, Josh went head foremost back down the staircase to the motor. Slowly he eased it into speed—but no weight returned. He had expected none.

AFTER EIGHT HOURS of delirium of sorts, the *Arachne* was going again. But whither? She had lost her force-line, simply gone off her gravitational "trolley", and had to get back onto some branch-line or other.

Parsons explained it to the subdued, white-faced passengers. "We're—well if you've ever flown kites, and sent pieces of paper flying up the string to the kite, you understand our situation. We're a paper that's cut through and blown away. The space we traverse is filled with an immense number of 'kite strings' lines of gravitic force, in fact—stretching like a web beyond imagination between all the planets, stars, every heavenly body. Where we are now, my friends, we are among the webs from Earth to Mars, Mars to Earth, Venus to Jupiter. If

we can swing onto gravitational force-lines between Venus and Jupiter, we can follow them back to the point at which they cross Earth-Mars lines, and make a shift and go on with our work. Just at the moment, we're in the doldrums. We've got to accept the situation. Play bridge. Get drunk. Make love. Do anything, but don't get panicky. We'll get by all right, and there is no longer any danger."

"You're lying!" said Mona McKellar. She was Jack Islip's girl, or had been. Now she had a bruise on her head and a bad case of jealous fury. "You know we haven't got a chance. We shouldn't believe the captain, any of us——"

McNab entered the lounge, where the conversation was going on, in time to hear Jack Islip interrupt Mona McKellar. And Jack said, "Shut up!" with a voice like the crack of a whiplash. "And if you *don't* shut up, I'll bat your ears down!"

Mary Purdy may not have been exactly a lady at the moment, for she clapped her hands, audibly. And a man who didn't matter much otherwise, spoke up and said: "Listen you," to Jack Islip, "you can't talk to a lady like that with *me* around."

"Just what," said Islip, "are you going to do about it? I'm responsible for this silly filly, and if she tries to start another panic on the *Arachne*, a kick in the teeth will do her good and save the situation!"

"Why, you——" The stranger launched himself at young Islip. Young Jack, his face suddenly exalted, half rose and met the attacker with a right to the button that stretched him on the deck. Islip floated away to the far end of the lounge. The stranger danced away loosely, somewhat after the manner of a dropped dummy on its way down.

McNab, coming in to report to the skipper that everything was all right, ran right into this situation. He made

his report, stated that he was now enroute to his quarters, as previously ordered, where he would consider himself under arrest until the *Arachne* returned to her home slip at New York.

Parsons turned red and roared out, "There'll be no malingering on the *Arachne*, Josh! No sleeping in state-rooms when there's work to be done. So sleep what you need, but get back to work when you've had your share. Ah—and we'll forget everything else. At least *I* will. I hope you will. And I ask the passengers to forget a lot of things they've heard."

"I'll never forget!" cried Mona McKellar. "Never! I'll sue!"

"What's that?" yelled Jack Islip, drawing back his hand and advancing on his erstwhile sweetheart. She whimpered and swam away hastily toward the reviving man Jack had knocked out. He held out his arms, very sympathetically, to receive her.

Thus was everybody satisfied, including Mona, who felt herself lucky to find a man at the exact moment of her need.

VI.

"JOSH McNAB," said Skipper Parsons, "you are an incorrigible old coot! I feel sure that you could have brought the *Arachne* to port without the slightest bit of danger."

"Aye, sirr," said Josh McNab.

The two were standing side by side in the control bridge. They sounded, if there had been any listeners to give the matter thought, like two people who had a very deep hatred for each other. Parsons' eyes were frosty, but McNab knew it was fake frost, somehow like the kind they made in Hollywood to save themselves the cost of trips to cold countries. McNab's eyes were twinkling.

"Can't you say anything but 'aye, sirr,' McNab? You go along with me all these years, saying as little as pos-

sible, yet you can cause more trouble and discombobulation than all the rest of the crew put together. Now, my theory of the whole business is this: you wanted to help Mary get her man back. And so, you turn my ship into a kind of Cupid's kindergarten, and I'm not so sure I like it."

Josh McNab didn't answer. He had learned long ago that Parsons had a quick mind, and that almost anything Josh said might conceivably be used against him—sometimes in embarrassing company. And this one he didn't like. He couldn't quite see himself as a naked Cupid with wings and a bow and arrows. The picture didn't somehow fit in with his idea of Scotch dignity.

Besides, if he talked much, Parsons was inclined to mimic his brogue. Josh didn't especially mind that ordinarily, Parsons was terrible at it. So the less he said the less he'd have to account for when the final reckoning was in. And this talk of turning the *Arachne* into a Cupid's kindergarten filled Josh with uneasiness. It came quite too close to the truth.

He knew, officially, how he stood with Parsons. All right—or he wouldn't be on the control bridge now, waiting for the *Arachne* to do her gentle "somersault" for the lowering away to Mars.

The shift from the Jupiter-Venus force-lines to the Earth-Mars lines had taken place with no trouble whatever. Moreover, with the motor going great guns again, and the great density of the Jupiter-Venus lines they'd ridden a while, the eight hours were going to be made up. The *Arachne* would be warped into her Martian slip right on time. That was a great saving, for if she were not, she'd have to stand off Mars until the right city came under her as Mars revolved. The *Arachne*-type gravity ships went up or down, but they had to be towed to move sideways. Thus the lost time, unless made up, could easily double itself. However, that would

not happen now. The gods of interplanetary space were working with Josh McNab, Mary Purdy, Jack Islip, and Skipper Parsons, to say nothing of the sturdy old *Arachne*.

"Have I the captain's permission to visit the bridge, sir?" came a calm, clear voice.

SKIPPER and Chief Engineer turned for a look. Without waiting for Parsons to give an affirmative answer, Mary stepped into the control room, followed by a sheepish Jack Islip.

"It is against the rules, Miss Purdy," said Parsons, "for passengers to step onto the control bridge. You will remove yourself and your man Friday at once."

Jack Islip started back in some alarm. Mary snapped at him.

"Stay where you are, Jack. The skipper's bark is far worse than his bite! With or without permission, Captain Parsons, I'm going to stick with the bridge through the somersault. When does it happen?"

"Right away, Mary," said Parsons. "And I am calling your attention to a rather obvious fact—obvious to anybody but a man in love, Jack Islip—that this young woman calmly overrides the authority even of an interplanetary Captain of a Caperton ship—the *Arachne*, no less. She rules the roost with calmness and complacency. So she will rule, I insist, in her home—which you will be deceived into believing, if you're soft and a bit screwy, is also your home. It isn't. Not at all. Mary will boss you and make you like it."

"I *shall* like it," said Jack Islip defiantly.

"Then, my friend, you're a gone gossling. Am I right, Josh McNab?"

"Yon skipper is alway richt!" said McNab, in a voice which showed plainly that he actually thought the skipper never was. Parsons choked and his face got red, but he forgave Josh because he

could see that he was outnumbered. "But 'ee's a bit daft in his richness, at times."

Parsons, having studied his charts a bit, and satisfied that he had reached about the right spot in space, stepped to his inter-level address microphone. McNab grinned and winked at Jack and Mary as Parsons straightened his uniform and his body, as though, by speaking into the microphone, he were preening himself before the eyes of a large bevy of admiring females.

"Ladies and gentlemen," he said, "it is now time to reverse ship and lower away for Mars. Will you be kind enough, for a few minutes, to hang onto something, while I about ship? I'll give you five minutes to get set, no longer. Then, before you know it, the worst will be over, and we'll be settling toward Mars instead of diving into it head foremost."

Josh McNab had dropped back to the Tunnel by the time Parsons had finished his speech. Mary and Jack Islip grabbed at what they could find—including each other. Parsons went back to his controls, and kept an eye on his watch. Mars looked to be above the ship. But in less time than it took to tell about it, Mars was below the ship, and the *Arachne* was crawfishing down the Martian lines of force.

"It's like shooting an arrow," said Parsons, "that turns in the air and hits the target with the feather end. Now, to tell the passengers."

He stepped to the inter-level microphone again, barked: "Carry on, everybody. It won't be long now—thanks to Josh McNab and his black gang!"

Which struck McNab as being pretty decent of the skipper, except that he was overdoing the coals to Newcastle, and making himself out a fine tolerant figure of a man. When he had Parsons alone he would point out this fact to him. As though Parsons didn't know already!

Ah, a bonnie lass and a fairish red-

headed lad! They made a fine picture, standing there together, waiting for the *Arachne* to make port.

THE TURN completed and the rotor humming smoothly as it eased the liner "down" to Mars, Josh returned to the bridge. "If ye gang to the belt promenade," said Josh McNab, "ya maun see the helicopters coom oot to warrp the *Arachne* in."

Parsons grinned at him. "Go along, Josh, I know you like to watch it, too. Come to think of it, why should I miss it?"

"With a' th' winnin' to wutch, skipper, why should ye?" snapped Josh McNab.

So the four rode down to the belt promenade, where Parsons could run the *Arachne* as well as anywhere else, and stood against the ports, looking down the bulge of the *Arachne's* hull.

"Yon they coom!" said Josh McNab.

Mary spotted them, too. The other passengers also clung to the ports, to watch the coming of the helicopter tugs. They came like tiny sparrows, winging up to the *Arachne*. McNab's eyes glowed. So did Parsons'—though his dignity prompted him to try and look stern, unbending and unconcerned.

For a few minutes longer the *Arachne* was the concern of McNab and Parsons—until the tugs fastened onto the hull. And McNab, never more conscious of the *Arachne* and his pride in her, looked up at the ceiling, above which were the passenger staterooms in their many and various shapes, their modern—reasonably—serviceable beds, closets, beautiful furniture altogether. In the eye of his mind he could peer up the narrow inside of the ship, threaded through its heart by the Tunnel and the Tunnel's intestinal investiture, and see each room, each section of his beloved ship.

And in the ear of his mind, when he had made the mental journey, he could hear the whispering of the thrust-spread-

ing girders, telling him that all was well.

Also he could see his crew, in the Tunnel, resting on their oars, so to speak, and filling the Tunnel with tall lies of how each of them in his own way had saved the *Arachne* and all her passengers from sure destruction in time of near disaster.

And then the helicopters were maneuvering about the *Arachne* for position, and the ship was in the hands of her friends. The captain, in a word, had relinquished command to the pilot.

Now there was nothing to do but wait.

MARY STOOD by Josh until most of the passengers had debarked. Then she grabbed his ears, pulled him down and kissed him again.

"Ye're a grrrand mon, Josh!" she said softly, with stars in her eyes where he had seen so much misery.

"Hey, you, Mary," said Jack Islip, "what's the idea of kissing that old coot when you could have me for the asking?"

"And why, laddie," said Josh McNab, to cover his embarrassment, "should yon lassie be foored to ask?"

Hand in hand, the two started for the exit. They stopped to permit Mona McKellar and her new swain to precede them. Mary giggled. Jack Islip unashamedly put an arm about her waist and squeezed. Josh McNab felt a slight reddening of his ears, and tried not to look at the skipper.

Skipper Parsons snorted. "Cupid's kindergarten. Teacher McNab, shall we go ashore?"

Josh had enough of being embarrassed. It was time to embarrass someone else. So he yelled to Jack and Mary, before all the passengers could get away, and there should be no one to hear.

"There's a bonnie meenister around th' furrst corner to th' richt, Murry, Jock! Do ye see him at once, baith of ye, an' tie the knocht befoor th' next fight!"

It fell flat. They didn't get embarrassed at all. They started on the run, after one swift glance at each other, "around the first corner to the right."

"Weel, anyhoo," said Josh, sighing, "yon laddie didna try to kuss me!"

"I noticed that, Josh," said Skipper Parsons, "but they'll be going back with us, and I'll suggest to Jack Islip that you felt hurt, slighted and snubbed that he did not."

Josh McNabb glared at Skipper Parsons, and bit off his words as well as a Scotch engineer could.

"I dinna doot ye'll do it, sirr!"

Parsons glared back.

"And will you take it like a man and an engineer of the Caperton lines, as it is your duty to take whatever your captain hands out?"

"Aye, sir, that I will; but I willna like it!"

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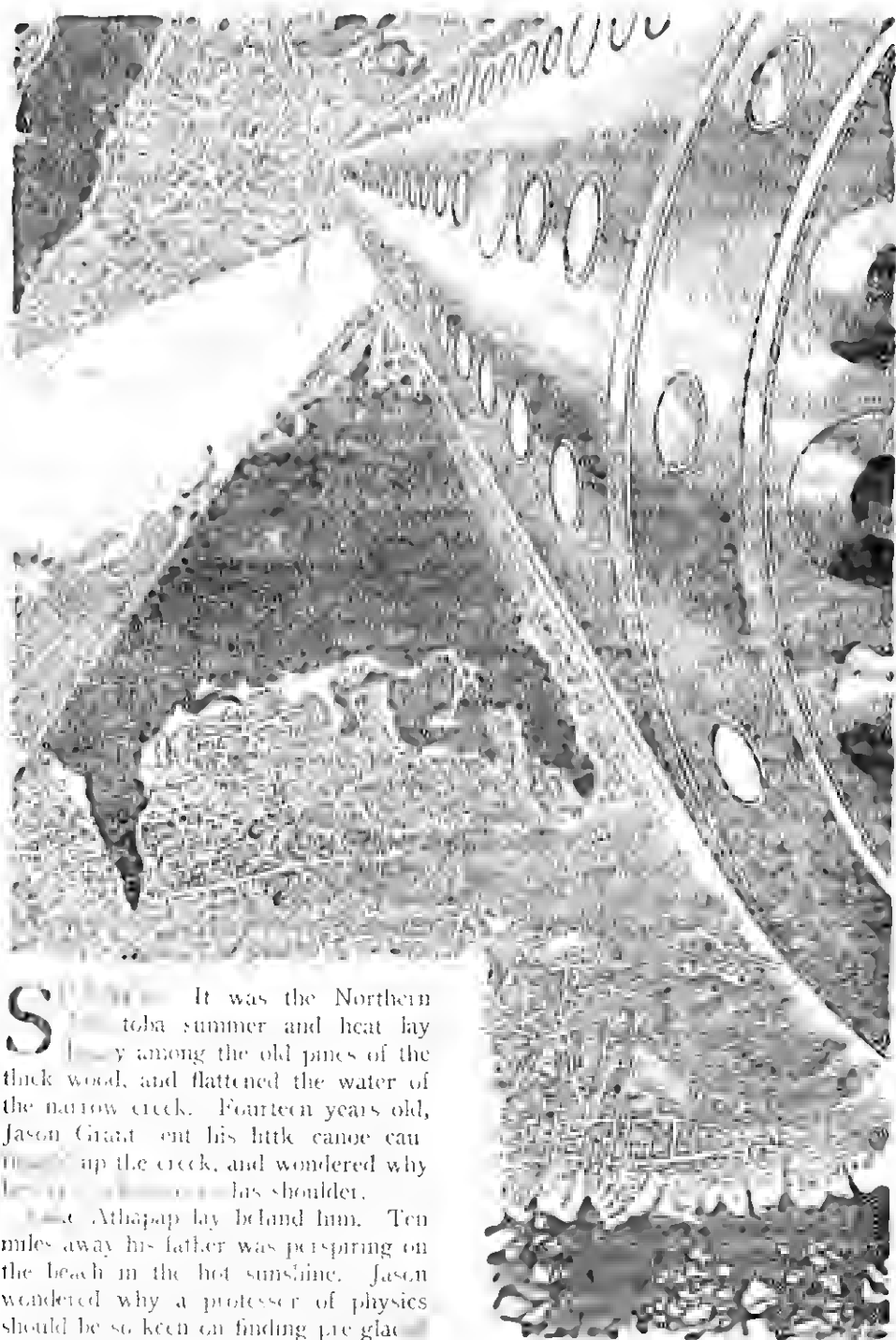
JASON COMES HOME

by A. B. L. Macfadyen, Jr.

*A boy sails out, trapped in an unmanned spaceship—
A man, years later, sails back armed with a mighty
weapon to sweep Earth clean again—*



*The great beam swept across the planet, cleaning Earth of the
green scum of living stuff.*



S It was the Northern toba summer and heat lay among the old pines of the thick wood, and flattened the water of the narrow creek. Fourteen years old, Jason Grant rent his little canoe can up the creek, and wondered why his father was on his shoulder.

Back Athapap lay behind him. Ten miles away his father was perspiring on the beach in the hot sunshine. Jason wondered why a professor of physics should be so keen on finding pre-glac Indianware that would disprove the orthodox view of the Mongolian origin

of the early Americans. Jason didn't mind; vacationing in the wilds of Canada was much better than spending the hot summer among the canyons of Chicago.

But this sudden silence worried him. Just half a mile back there had been mosquitoes humming noisily, and partridge shooting up among the trees, and once he had seen a jumping deer. Here, there was not a sound but the water dripping from his paddle, and the sound of his own breathing. He didn't like it.

He sniffed, lifting his brown face to the soft wind that stirred among the trees. There was some sort of alien smell to the place— And that stuff on the trees—was that moss, or some sort of greenish slime? He put in to the side of the creek, and his hand went out to a patch of the stuff.

He stopped that hand in mid-air. It *was* slime—nasty, viscous stuff like heavy bile.

Jason—his father had not remotely suspected that one day his son would wander a stardust path infinitely wider than that of the Hunter of the Golden Fleece—went back to the middle of the stream. He felt safer there.

Suddenly he wanted to go back. He murmured, "There's something here I don't get," and dipped to turn. But then a whiteness strewn among the trees a short distance up took his eye. He stared. He sent the little canoe shooting forward. Excitement rose in him. Those looked like skeletons.

Stepping distastefully among the diseased trees, he suddenly recoiled in horror. They were not skeletons. They were things infinitely more hideous. Once they had been something like men, though with alien, abnormally heavy skulls and great, stooped shoulders.

Now! The boy's stomach turned over in revulsion. It looked as if all the bone, all the hard, firm matter in the bodies, had run out like wax melting. These were flaccid bags of skin and **fast-rotting** flesh, flattened and loose and

entirely revolting. Jason took a second glance and turned before he should vomit.

The flash of sunshine on metal beyond the thick trees caught his eye in turning. He stared. About a hundred feet away were patches of bright steel, seen between the obscuring, slime-hung trees.

He hesitated. Then, lithe as a cat, he ran carefully between the high old pines. Not once did he touch the stained bark. The silence was thick and hot. Jason leaped nimbly over a deadfall.

IT LOOMED above him now. It was vast and smooth and cylindrical and the boy had not the faintest idea what it was. Thick windows were fused into the metal sides. Trees had already begun to lace branches over it. The slining bulk was dim in the shadows. Jason decided to go around to the other side.

But then he came to a strange, high doorway, perfectly round. The door to fill the aperture was a perfect disk, half rolled into a slit in the framework.

He decided to look inside and climbed up over the rim. Within ten feet was another round portal. Beyond, he found a long corridor, silent and still. Lights set in the ceiling burned dimly, steadily. The boy wondered how long they had been burning.

Jason shivered suddenly. He didn't like the look of the corridor. Turning back to the door he noticed a little round light set into the wall. Experimentally, he fingered it.

And beyond, the outer disk sighed and slid shut. A fraction of a second later, the inner disk closed, too.

Jason bit his lip and fought down the panic which suddenly closed like a cold hand about his heart. He rubbed the light again. He twisted it.

Nothing happened.

Of course; there would be another light somewhere. He looked around,

keeping his eyes away from the distant bend of the corridor. If anything came around that bend—— He saw a panel in the wall opposite the closed door.

Within were strange switches. One of them looked something like the light. He put his hand over it—and cried out.

Far away in the depths, machines had suddenly come to life with oddly human screams. It brought the hair erect on the boy's neck. An instant later the floor seemed to rise up and strike him as a tremendous acceleration made his legs like things of rubber.

He lay for a moment, then struggled erect. He would have to go down that corridor. He started off, trembling and wide-eyed—and came to a window. Eagerly he looked out. The sight of the trees and the squirrels would help him to quiet——

But he saw a blackness without end, a vast velvet backdrop for the infinite stars which were like a million cold eyes watching him. Only that he saw, and the blinding disk of a sun that seemed to shrink even as he watched. Only the stars and the Sun, and the silver-dust glory of the Milky Way, clear and sparkling beyond belief.

Jason stared and stared, until his eyes were blurred with stars. Then he slid to the floor in the first faint of his life——

THE BOY flattened against the doorway and stared into this great room at the heart of the speeding ship. His eyes were dazzled by a thousand flashing lights; his gaze was blurred by trying to follow a hundred spinning things at once. Here were the machines which were sending the great craft flicking through the emptiness beyond the Solar System. And there was not a single living thing to tend to them.

It was a week after he had unwittingly thrown the ship into space. After the first terrible shock, Jason had rallied. Room by room, corridor by corridor, he

had slipped through the hurtling vessel, expecting at any instant to be discovered by living replicas of the beings whose boneless bodies he had found among the trees.

He had found nothing living—nothing but a tiny red squirrel which still eluded him. He had searched until he was dead with weariness. The ramifications of the great ship seemed endless; he had lost his way, gone in circles, countless times.

He judged that it was two days later when he found the storerooms close to the keel of the ship. He had eaten his fill of the strange synthetic foodstuffs; some of them had made him violently sick. He had gone on, exploring the upper decks, the living quarters——

There were a thousand things he did not understand. He walked in a perpetual wonder, bothered by a fear of the unknown that was not to leave him for many months. Even now, staring into the flashing color and motion of the power plant, he kept looking back over his shoulder.

Cautiously now, he went into the vast room, weaved among the towering, humming bulks until he came to the center. Here was an enormous thing.

A vast hemisphere of thick, transparent metal housed gleaming motion. Jason pressed against the glassy surface. His father had taught him elementary physics thoroughly, but this meant nothing to him—yet. There was a coruscating point of light, so small it was almost invisible. He could not bear to look at it. Great, slow-moving arms of reddish radiance weaved from it, like sucking arms, moving with a curious impression of titanic, chained power.

Jason moved away. He jumped suddenly. Something had stirred in the doorway. Then he saw it was only the squirrel and tried to smile, tried to call to it. But he could not speak.

Slowly, because the acceleration still made his body leaden, the boy moved

out of the engine room. It was time to eat again. For a moment he saw the full horror of his plight. He could wander forever. Nothing to do, day after day, but eat. For years—then he would die—sleep after a living death locked here —

He began to cry, great tears rolling one by one down his face.

On the following day he found the library.

It was a small, book-lined room behind the control room. There were tables, and a queer machine in one corner with headsets and an audio speaker. Jason took down some of the books. He opened one, turning the thin metal pages, looking at the strange script, and the alien, oddly frightening diagrams.

In one book he found nothing but pictures. They were scenes of terrible war, frightful carnage and blood. They showed squat, big-headed creatures battling nameless monsters with flames—green, thin flames. Or strange suns and stranger planets with green skies, under which white roads carried curious machines, speeding.

Jason put the books back. He didn't like them. He went to the machine in the corner. Among other things, there was a headset, and a light that glowed above a screen. He put on the headset, wondering, and played with the switches. Nothing happened. He put a book on the screen, under the light, wondering why he did it. Then he tried the knobs again.

Jason froze suddenly. A voice was whispering in his brain: "Translating these equations into words, the ratio of the concentration of H plus in the two acids at the same dilution is the square root of the dissociation constants—"

Jason looked around wildly. The room was empty. The voice went on. He snatched the book from under the light. The voice stopped.

The machine had converted the unknown script into English!

Jason, that lithe boy, stared around at the book-lined walls. What secrets, what knowledge, must be here! And here was a translating machine.

Could he learn enough to find his way back to Earth?

JASON GRANT, eighteen, murmured in Sirmian: "Who was it father used to rave about—Dirac? Something about space being an infinite sea of negative energy—not convertible to work. Tiny fragments raised to positive energy levels became electrons and could be detected by the work they did. The hole left was a positron—which is why they only exist for a fraction of a second.

"The Sirm had the same idea, but enlarged it to include all atomic particles! Protons, neutrons, inetrtons—which are unknown to Earth. Matter is thus formed of particles of positive energy, loaded with potential work. Reduce it to negative energy levels—and all that work is freed! What an idea!"

There was a half smile of wonder on his wide lips as he leaned his powerful body against the transparent housing of the main power unit and watched that ineffable spark in the heart of the twisting beams of pure power. He shifted slightly. Muscles like steel cords rippled under the green tunic. The constant acceleration—twice Earth's gravity—had built those sinews.

Jason, with Petè, the squirrel, on his shoulder, looked around the now-familiar bulks of the other machines in the great engine-room. Now, barely four years after that unwitting boy sent himself hurtling into deep space, he knew them as well as he had ever known his old outboard motor. There were the air-conditioners, the integrator, ranked transformers and generators and accumulators, banked feeders for the great cannon.

It had been slow, tedious and heart-breaking work, the gaining of that knowledge. His father had taught him

much physics, even some calculus. But the strange metal books of the Sirn, with their weird script and even weirder diagrams, had been the advanced reference texts of the picked crew which had manned the scout.

Jason had begun at the end of science. Calculus, tensors, matrices, determinants—he had struggled with those summits of mathematics before he could solve a simple quadratic or prove the binomial theorem. He had plunged into a theory of atomic structure a thousand years ahead of terrestrial ideas before he understood a simple static generator.

Then slowly the chips of darkness fell away, and confidence came. Day after day, month after month, he studied. There was nothing else to do. Within the first week he had finished his exploration of the ship. Nothing to do, as the great silent vessel leaped on through the interstellar wastes, and the miles lengthened into light years, but delve deeper and deeper into the books of the Sirn. And they worked direct on the mind—indelibly.

"The Sirn." Leaning there against the plant housing, Jason whispered the name to the squirrel chattering on his wide shoulder. That was what, in their own language, the beings who had built and manned this ship called themselves. The Sirn. It made Jason think of shadowed valleys, and snakes rising beneath the moon.

He whispered, for the hundredth time: "But *why* were they there, among the trees, with the door open and the ship empty? Why had they come? What happened to them?"

HE SHRUGGED, nearly dislodging Pete. He turned and strode away to the small but perfectly equipped astronomical observatory in the bow of the great scout. He felt sure it was a scout. The books spoke of other craft sent to other systems.

There, at the controls of the great

electronic telescope, he scanned space, as was his habit, for several minutes. Endlessly, he watched for the Sun—for the most bitter thought, the thing which turned sour all his new powers, new learning, was this: He still did not remotely know where he was.

A month after that frightened boy had resolved, somehow, to get home, he had, recklessly enough, managed to reverse all the controls. The great ship should have doubled back on her tracks exactly, but the months had passed and no sign of his own Sun appeared. Desperate, fearful of traveling hopelessly beyond the Solar System, Jason had locked the controls and set the ship in what he had hoped was a great curving path. But now, four years later, he was quite lost.

There were charts. But the Sirnian charts oriented with respect to the system of the Sirn. Since he did not know either its position or his own, he could not calculate a course on their basis. The Sun, he remembered from his father's talks, was a Class G Yellow. In the great charts of the Sirn there were five thousand Class G Yellows. Many lifetimes to search them all——

He turned away from the screen showing the infinitely remote, cold silvery eyes of the stars—never yet had he seen a planet—and ran off a few spectrograms of nearer stars, for practice. A few minutes later he was studying the still-damp prints—yard-long strips of thin metal, crossed with thousands of dark lines. Abstractedly, he measured a few lines with the photo-electric micrometer, and entered the data in the charts.

In the charts——

Jason, eyes widening, whispered suddenly: "That's it! Why didn't I think? They've got the fingerprints of every star within a dozen light years—including *their own*! I can pick out their sun by its spectrum! Why—no, I can't do it with our Sun—haven't the data. But I can find the Sirn's, head for their

system—and land and ask where this scout was heading for!"

The youth's eyes glowed.

Hastily he rifled through the charts, then stepped to the spectrograph files. In a minute the spectrum of the Sirnian primary was in his hands. He slipped it under the selector of the telescope, and set the tremendously powerful eye scanning space in all directions. When the cross hairs centered on a star whose dark lines coincided exactly with those on that spectrograph, the telescope would halt and signal him. And no two stars had the same spectrum.

TWENTY, Jason Grant sat in rubber cushions before the main electronic screen and studied a small white star almost in the center of the field. He smiled wryly. Two years. The home star of the Sirn had been even farther than he had thought. Only after many long weeks of patient scanning of the millions visible had the telescope picked out that unimportant-looking Class F White.

He murmured to Pete—now a little slower and a little grayer: "And what if they don't like us, friend? They'll let us land—their own ship—but when they see who's in it, what then? Maybe they'll think we've pinched it——"

He crossed to the controls of the ten millimeter transmitter—a set which, housed in a perfect vacuum, was capable of flashing signals across distances up to half a light year, with a velocity many times that of radio. He knew how, too—the books of the Sirn had told him. Electric waves, retarded by a static gravity field, were accelerated by a synthetic, spinning one, much as deuterons were accelerated by a rotating magnetic field.

He threw current into the great heaters. Iridium filaments seemed to vanish under the enormously high frequencies—bordering on the visible band—being impressed on them. He punched out a

general call on the now-familiar symbols on the keys of the teletype.

Then, leaving the circuit of the receiver closed, he went away to the library.

FIVE MONTIIS later the white star was an enormously brilliant point on the main screen. A day later he plunged in past the orbit of the sixth planet, then on the far side of the sun.

Heading directly toward the fifth planet, Jason reflected with rising excitement that this was almost as good as being home again. Home! There was an inexpressible longing within him. He thought of the green fields and windy hills of Earth, and lakes calm in the heat, and the traffic on Michigan Boulevard at five o'clock in the afternoon when the shadows were rising up the sides of the buildings——

He sighed, muttered, "I've *got* to get back," and turned his attention to the controls.

The fifth planet became a disk with unnerving rapidity. Jason worked furiously at the switches. He lacked practical experience of the problems of working in the confines of a system. The ship slid rapidly at the greenish planet. The misty sphere leaped alarmingly about on the screen.

It was no use. Jason gave it a wide berth. He had too much velocity. He leaped past the planet like a flash of sunlight. For an instant there were seas and continents on the screen, and he reached hurriedly for the controls of the automatic cameras.

As the scout flicked on toward the fourth planet, sunward, he ran the films through the developing tanks and projected the positives on a viewing screen.

The best plate showed part of a city. Even with the highest power of the telescopic camera he had been unable to get much detail. But still, even if pedestrians were invisible, aircraft should have been seen. They were not.

Jason studied the faintly greenish, toy-sized buildings on the white screen, and felt disquiet stir in his mind. It was an empty city.

He sighed faintly and went back to the controls.

He had better luck with the fourth planet. He managed to circle it within its own atmosphere. Seas, here, too—the Sirn had not sent scouts to find more habitable worlds. And continents and islands—quite like home, except that there seemed to be no cities whatever, and little vegetation. He did not drop lower than a mile. From that altitude he decided that the greenish aspect everywhere evident was due to some characteristic of the sunlight.

Curious. He went on to the next planet, the third.

But it was a duplicate of the fourth. Jason wondered about the possibility of landing and exploring further. He decided against it. He would search the system for living, talking beings. He murmured, "What the devil—is this the Sirn system, or not? If that confounded selector has picked the wrong sun——" and leaped away to the inner two planets.

A few hours later, utterly and completely baffled, he was lancing out through the system again, heading for the sixth planet. Of the two inner planets, one was long since airless and scorched to ash. The other, to him, seemed habitable, but it was quite empty of life.

Jason sighed, and his brows knotted in worry. To have come this distance on a fruitless chase—— He watched his last chance grow rapidly on the screen.

A clear thousand million miles from the Sirnian sun, Planet Six yet received sufficient heat from that white primary to make it appear green and comfortable according to Earthly standards. Rippling in through the atmosphere, Jason studied glinting seas of emerald, and the slow-moving white clouds with pleasure

mixed with high anxiety. If this world proved empty——

He dropped quite low and sped to the temperate zone. It was full daylight here and the land was green in the sunshine. A trifle *too* green, perhaps.

A disturbing thought was beginning to tug at Jason when suddenly faint distant outlines of high spires, buildings, appeared out upon the horizon. Eagerly he set his course for them. He murmured to Pete: "If there's nobody in sight, I'll land anyway. They must have libraries, records——"

A HIGH-PITCHED whistle broke off his words. He spun. The radio, silent these past months, had suddenly awakened! He reached out and shut off the signal note as a deep voice suddenly filled the room. Sirnian!

"Turn, stranger, turn and flee!" the voice rang out. "Know that the very air of this planet is most foully and hideously tainted. Instantly, if you wish to stay alive, rise beyond our atmosphere! You will still hear me."

Jason, who had frozen in amazement, hesitated, then shot the scout into the heavens until the barometer registered zero pressure. After a minute the voice went on.

"Have you heeded me? I cannot tell, I am not observing your ship. I who speak am already dead. My recorded voice is reaching you on the waves of an automatic transmitter, set to radiate whenever a craft comes within a thousand miles of this planet. I may be too late even now, depending upon your speed.

"Listen, then, to what I have to say:

"I am the last living thing in this solar system. I leave this record on the tape with my dying breath. This is the planet of the Sirn, most advanced race in this system. We held out against the Swarm while lesser races melted in death.

"It was a bare twenty years ago that

the Swarm was first seen, a dark cloud against the stars. The curve of the great cloud—of dust, as we thought—was plotted. It was found to intersect the course of our system. Ships were sent, to explore the cloud. They never came back.

"Then the cloud, the Swarm, apparently as harmless as dust on a summer's day, rushed down upon these planets. Four, first to meet it, was swallowed, then appeared again. And not one trace of life could our most powerful telescopes discover on it. Vegetation, low animal life, had been utterly wiped off the surface of the world.

"For that Swarm, that hellish dark cloud, was a vast horde of ultra-microscopic bacteria spores, driven by the enormous radiation-pressure of cosmic rays!

"Plotting their path back into the depths of space, our astronomers determined their origin. In some dark, abiogenic manner, they had come into existence in the black heart of a colossal calcium cloud near G-883, some five thousand light years distant. And in that fact lay the explanation of their carnal appetites.

"Calcium was essential to their metabolism! Calcium—the principal mineral ingredient of animal bone and insect shell! Entering the atmosphere, the spore walls rupture, and the nameless contents emerge, to take on their infernal and eternal hunt for calcium! In the heat of our system, germination takes place with abhorrent speed. Our atmosphere is rank with the things.

"Their pathological effect on living things is a matter of seconds. The internal bones, calcium drained from their very hearts, slump instantly into things of jelly; the body becomes a bag of skin. Life lingers. Then the skull crumples and flows like water.

"Useless to detail the thousand attempts we made to defeat the horror. All ordinary measures were worthless.

These bacteria are utterly immune to every extreme of heat and cold, pressure, or environment. They have no natural enemies whatever, and their size—approximating that of the virus—makes hermetical sealing almost impossible.

"We have sent scouts to neighboring systems, notably to the nearest, G-458, but they have not returned. We fear the ships were infected.

"So beware, stranger! Seal your ship! Do not venture out, but flee instantly beyond the confines of this lost system!"

THE DEEP VOICE snapped off abruptly, and there was only the distant hum of the generators. Jason, his features strained by the frightful recital, buried his head in his hands.

It was curious, but there was for a moment only one thought in his head: none here could indicate Earth on the charts, he could never venture out. Then full realization of what the other had said filtered through his gloom: "What an ass I am! I'll wager 'G-458' was the Sun!"

He lifted his head then, and tensed his legs to leap for the door.

And saw Pete's tiny body on the floor not five feet away, with all the bones in his body like wax, still living faintly, and a greenish slime already rising—

Jason uttered a single terrible cry. He saw greenish slime form swiftly on the plaster of the walls. He sent his craft leaping away—anywhere—from that infested world. Then with horror prickling on his skin, he tore down the corridor. And did not stop until the full length of the ship was between himself and the control room.

In a tiny electrical storeroom, with the door sealed by vacuum wax, he muttered, "Poor Pete! The damnable things must have seeped in through the bow there—I've suspected that place was leaking. And the walls—the walls are plastered! Calcium carbonate! Oh,

Lord! They'll be through the entire ship in a few hours. What am I going to do?"

He applied more wax to the door and walls. Used in sealing vacuum joints, it would keep out even the ultra-microscopic bacteria. But once they got to the stores—those calcium-laden vegetable concentrates—and the walls, carbonated calcium oxide! Even now a tide of greenish slime was probably swelling down some distant corridor.

Slime!

Where had his thoughts been? Incredibly enough, it was only then that the memory of a forest hung with greenish, viscous stuff like heavy bile came back to Jason. He saw again five alien things lying boneless on the edge of a creek in Northern Manitoba. He groaned, "What a blind fool! This ship must have carried spores trapped on the outside hull when they went to Earth! They would germinate instantly on landing, and trap the crew when they ventured out."

He paced around the small room in restless strides. "It's been six years — Old Earth—are you holding out? Let me think—let me think—there must be something they haven't developed immunity toward, something they've never dealt with. He said all ordinary germicides and bacteriophages were useless. Space is their habitat. What never exists in space?"

ALMOST INSTANTLY the answer came: "An electric current!"

Jason stopped as if he had been struck. That was the answer! But how? Impossible to apply a minute jolt to each deadly germ— He needed a spray of electricity. Charged dust particles—particles of steam—no, ions! Ions—charged atoms which would discharge on touching the loathsome bacilli, annihilating them with minute charges of static electricity. Could he fill the ship with ionized air?

He could. Jason took a small emergency spacesuit from a hook. He began to plaster it with the vacuum wax. He would have to walk a hundred feet to the air purifiers in the great engine room. Fortunately the wax was a hydrocarbon, not a calcium compound. Unless the hellish motes smelled him through it—

His skin prickled and his toes shrank from contact with the floor. Jason went hastily down a corridor whose walls were festooned with creepers of green slime. Already it seemed that most of the calcium had been stripped right out of the plaster, leaving the other constituents to evaporate as carbon dioxide. Bare steel frames showed.

At any instant he expected his bones to go viscid and soft.

The engine room—walled in steel—was almost free of the green mucous. Jason sealed the door with wax and went to work. Ionizing a gas, on Earth, was accomplished in a restricted way by discharging an electric current through it, or by ultra-violet irradiation. The Sirm removed the ion electrons directly and completely with electric fields; stable ions were produced in prodigious quantities.

An hour later Jason was clamping huge electrodes about the great cylinder of the primary air purifier. He closed a switch. The steel of the conduit began to tremble. A distant crackling began, like lightning heard far away. The sound came nearer and nearer. Those were ions, discharging on walls and on—bacteria?

Jason tilted his head back within his helmet and stared at a patch of green on the plaster ceiling.

Slowly, reluctantly, that patch faded to dust gray, then fell in tiny flakes to the floor. Jason hurriedly took a sample, and examined it under an ultra-microscope. Just—husks.

Weak in the legs, he collapsed into a seat near the power plant.

AS G-458—a Class G Yellow which could only be the Sun—separated out of the silver-dust background on the green, Jason Grant worked long and intently on a great projector. The pulsing spark in the heart of the power unit would furnish him with almost unlimited power—enough to pluck old Earth from her orbit and throw her crashing against other worlds, if he wanted to.

He was trying to project the ionizing field as a great beam. Computation showed that it was possible, but the practical difficulties seemed endless. It was to be done simply by varying the relative positions of the electrodes, lengthening the fields. But that increased the field density in the neighborhood of the electrodes—where he did *not* want it. And he had found that his success before had been largely luck. The tiny slayers were themselves coated with a wax that insulated against most ions. Only the intense, activated-nitrogen atoms that had accompanied his ions had served to break down the waxy, otherwise-insulating shell.

But he achieved a beam which satisfied him a brief day before the scout streaked in past Pluto's orbit, and cut space toward the inner planets. In passing, he studied the four major planets. He had never seen them at such range before. Jupiter was a vast ball of ice, Neptune and Uranus even more frigid. Possibly there was life—he saw color changes on great Jupiter. All seemed free of the calcium bacilli.

Mars was a distant red ball of deserts and scattered tiny seas. He caught a brief glimpse of a tiny distant city, glowing faintly near the north pole. He did not stop. There was that vast longing in him to see Earth again, to walk the hills of home—coupled with the black thought that he might be too late.

He was.

He came screaming in through the thick air of his mother world exactly

six years and nine months after, helplessly trapped, he had fled out through it like a shard of light. Dropping to five thousand feet, he circled the planet again and again, until the outer hull glowed faintly in protest.

London—Paris—New York—Berlin. America—Europe—Asia—cold Siberian wastes—everywhere— Tiny Pacific islands, and ships at sea, and trains stopped in the heart of deserts. He went, and look and searched.

And everywhere the buildings were slumped, only steel frames standing. Everywhere the streets were empty of life, silent reaches strewn with debris of buildings and rusted surface traffic. Everywhere the greenish slime of the calcium bacteria.

Black murder in his heart, Jason Grant drove away to the north. At the exact tip of Earth's axis, two hundred miles high in the thin twilight air, he snapped on his great ion beam. Down, down through that space the colossal conical shaft spread, turning air molecules to blue-glowing ions, and draining electrons back up and into the accumulators as negative electricity. Around the cone a wavering lemon-yellow flame of activated nitrogen streamed upward, stripping the bacteria of protection, letting the killing ions reach them. Its base rested on the frozen Arctic Sea, and that base was five hundred miles wide.

Face pale and set, Jason sent the scout spinning in a slow, tight spiral about Earth. Slowly, day by day he crawled through the thin air, tracing an overlapping path about the world, sweeping with his broom of ions and yellow nitrogen flame the green-festooned surface of Earth.

And after his passage the green slime crumbled to gray dust, and blew away in the wind which roared in the wake of that great beam. Gray dust—empty husks without life—fragments of calcium that gathered in great clouds

against the Sun.

In ten days he was finished. Not a single cell escaped his all-penetrating beam.

SO THE WORK was done—but the world remained empty.

Dully, unseeing, Jason Grant sent the scout gliding slowly through the washed, pure air toward California. He set it down on a hill swept by the wind. A hill already greening with new grass. For the first time he stepped out into the sunshine and air of his home planet.

Home! He took a deep breath of the clear air, and his lips twisted wryly. The word mocked him. Home—to an empty world.

He lay down on the cool grass. The sun began to draw the weariness from his body. In a few minutes he was sound asleep.

After a while he seemed to be dreaming. He was flying through space without suit or ship. Ahead was a single green planet. He had to reach that planet before it died. It seemed to be dying even as he watched it, and suddenly he was running over a green meadow with enormous horrors pursuing him. They were giant, alien bacteria. The foremost reached his ankles, tugged at them, shook his shoulder—

Jason Grant's eyes came open. There was a girl over him. Her hands were on his shoulder. She was laughing and

crying and trying to speak at the same time. Her clothes were torn but she was dark and lovely. Beyond, racing up the hill, were five men and two other women. One of the men had silvery-white hair that shone in the sunlight.

"How did you do it, how did you do it!" the girl was saying. "Oh, this is wonderful, this is—oh—"

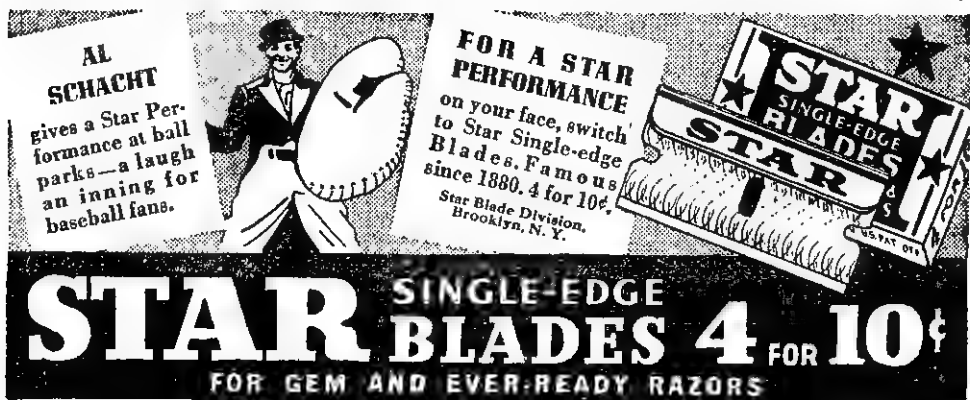
Jason blinked. This was not the dream. This was real. He reached out. His strong hand touched her arm. He said, "I thought everybody was dead on all the planet—"

"We're from Mount Wilson," she managed to say. "The bacteria reached us last—we managed to seal them out of the domes. We've been living there for— And then we saw the ship, and saw the bacteria die, and we've been trying to catch you ever since. We saw you land—Mount Wilson is just a few—the road, I mean—and we had the cars— Here are the others!"

All talking at once, the others panted up the hill. The man with the white hair put out his hand: "Magnificent! How did you do it? That beam— Where did you get the ship?"

Jason suddenly smiled. Strength and new courage came racing back to him. There might be other observatories which had escaped. The world was clean and new. They could build again.

Standing there on the wind-swept hill, he began to tell them.



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Martian Colony Dead

The Emergency Relief Expedition found the colony on Mars dead to the last man. Dr. Dexter described the scene with difficulty. All deaths, he said, had taken place with acute physical and mental anguish:

While death was attributable to starvation and exposure to the strange effects of the distant planet, he pointed out that toxic poisoning and psychological fear had shattered the colony's morale to such extent that ordinary physical and emotional stamina was at extremely low ebb.

Terse comments in the colony logbook showed the bitter, losing struggle of the scientists and miners during final weeks. Food was getting low when they saw the explosion of the first relief ship in space, but they grimly battled depression and carried on their work. With the unexplained disappearance of the second relief ship their spirits fell precipitously, but they holed up, conserving heat and oxygen and energy.

The real breakdown of moral fibre came with the peculiar, inexplicable cessation of interplanetary communication. Shattering the last remnants of self-control, the colony fell under the terrible depressive spell of complete detachment from Earth and the knowledge that they might be marooned forever.

Supply books, kept right up until the end, show a sharp rise of food and oxygen consumption after that jarring realization. Had the immediately previous rate of consumption been maintained, at least some of the expedition might have survived to witness the arrival of Dr. Dexter's relief party.

Human Difficulties Stop Venus Development

Professor Dietz reported at least six precious minerals could be mined almost on the very surface of Venus. The difficulties, he said, are not mechanical, but human. The peculiar properties of the planet have the immediate effect of disorienting the human body to an extent producing extreme nervous disorders within seventy-two hours.

"It would require at least ten years—very possibly two generations—to orient Earthman to Venusian conditions," he announced. "It would be absolutely impossible to transport sufficient supplies to maintain a colony for that period if human beings could withstand the utter loneliness and peculiar conditions of the planet for that period."

Questioned as to the possibilities of raising food synthetically on Venus, the aged scientist shook his head negatively. Something along the order of artificial culture might be done, he said, but the food would not meet the complete needs of man under strange conditions for such periods of time. He pointed out that even on Earth it is necessary for man to live on fauna and flora fundamentally indigenous to the locality.

The scientist himself had been aged unbelievably by the trip. He estimates that during his eight-month absence from Earth he aged about twenty years nervously and forty years muscularly.

Space Neurosis Halts Lunar Work

The World Interstellar Development Project announced today that further plans for the conquest of near-by bodies in space have been discontinued. While

FIRST PLANET

Thomas Calvert McClary

suggests that reaching the planets may not be half so hard for Man as living on those planets.



" . . . Relief Expedition reports Martian colony dead to the last man. Fear, lack of food and oxygen ended the bitter losing struggle. . . . "

vast deposits of vital minerals were discovered on the Moon, this is the eighteenth expedition to return empty-handed.

"We have found no means of overcoming what we may loosely term space neurosis," Secretary Davis stated. "Apparently, the orientation of the human body to foreign conditions is not feasible at present."

Chief Engineer Thompson pointed out that throughout history, development has been possible only with a backbone of agriculture. He mentioned various diamond, gold and silver mines, known to be rich, which have been abandoned because of the difficulty of getting men to live in uncivilized areas for extensive periods of time.

"The only solution to the problem," he said, "is planet farming. Give men a means of adapting themselves to life on foreign planets and real development will follow."

WE DO NOT have to go wholly into the future to surmise what will be the greatest problem of instellar development. We have the word of history. In no area on Earth at any time in known history has there been progress and development without the background of a self-sustaining local agriculture.

The really great bonanzas—the gold, silver, diamond and mineral strikes—have been few. The vast majority have been skimmed and abandoned before real proof of their unmined wealth. Of those mines profitably operated, most have been on slave labor—real slavery, or economic slavery. For one reason or another, men who actually worked the mines were forced to do so.

No real development, that is no actual production of new wealth and a sustenance of population, has grown around or followed the mineral strikes—*except where agriculture advanced simultaneously*. Eliminating this latter group and

giving any nominal cash value to human life, raw gold has cost very nearly its refined value in the long run.

It is probable that more real wealth has come from timber than from gold. It is certain that where vast tracts of straight timber once stood greater development followed the stripping than where the earth is dotted with petered-out mines. Agriculture followed—progressed hand in hand with—timber stripping.

This is not to say that mining is not necessary. But it bears a heavy cost, and nobody has estimated the ultimate costs when mines are worked out. Mining produces no security for the miner. When the mine peters out he must move on to find other work, or become dependent upon other workers.

Take note that it was not the gold of '49 which made California one of the wealthiest areas on Earth. It was agriculture, the actual development of the land. It was people moving there *to live*.

In northern Rhodesia, today, are immense mineral deposits—many of them known and surveyed. There is room and mineral wealth there for literally millions of men and women. But there is also the tsetse fly, bringing death and sleeping sickness over sixty per cent of the rich country. Cures for sleeping sickness have been discovered, but no preventative for man or man's domestic animals has been found.

In short, no farming in that area is yet possible. Working mines three months a year and a farm nine might be profitable for all concerned. But why not work the mine twelve months? Climate has much to do with that. And something more. It would be expensive building a railroad simply to bring supplies in and move the ore out for a handful of mines alone! So expensive there would be no profit, and at best, living conditions would not be pleasant.

But picture that same railroad serving many farms along its route. And the commerce between farmers. Towns spring up, the wilderness is pushed back; there is trade and profit and development. Mines, farms, supply towns, railroad, all suddenly produce wealth. In the assurance of being able to produce a subsistence for themselves, some frontier farmers also make strikes and become rich.

EFFORTS to combat the tsetse problem were made by Wynant Davis Hubbard. While the fly slaughtered domestic animals after each rain, and there appeared no way to control or exterminate the fly, the wild life of the area lived immune. Hubbard started crossing wild animals with domestic stock. He crossed Herefords with the savage Rhodesian wild buffalo, and Poland with the bush pig.

He tamed elephant, lions, the forty-pound Rhodesian cat. Only the local cat could defend itself against the wild animals of the district. Rhodesian mice and rats destroy more crops than all the locusts put together.

Bit by bit, he was successful. His cattle herds were tractable and began to produce high quality beef and milk. Cross-bred pigs began to show signs of heavy pork. Pet lions and tamed wild dogs acted as watch dogs—and learned to leave domestic stock alone. The tsetse came and as usual killed off the inoculated domestic cattle—but the cross-bred cattle maintained the immunity of their wild forebears.

The example would have application at home. Take the hoof-and-mouth epidemic among Western cattle. The wild bison and deer which once roamed the plains had no trouble of this sort. The hoof-and-mouth disease was finally conquered among domestic cattle—by slaughtering all the cattle that had or had been near diseased animals.

Modern man is not as intelligent

about some matters as his uncivilized forebears. It is only within recent years that he thought of cultivating blackberries, blueberries, strawberries. For years, a great many thought Luther Burbank was crazy. In spite of all our knowledge and mediums for the dissemination of information, you still find thousands of otherwise-intelligent farmers struggling to raise some foreign plant where it will not flourish, while they destroy an indigenous plant which might be cultivated to commercial uses.

It is well established among drinking men that the liquor to drink in any given locality is liquor made from plants native to that soil and climate. If you want to keep your broad-minded, but conservative, grandfather from seeing pink elephants in the tropics you don't serve him beer. You serve rum. A good glass of Irish whiskey which would serve to stave off chill and cold on the Emerald Isle would probably knock you into a cocked hat in the middle of the Sahara.

When the time comes that Earthman roams the interstellar spaces, the big problem is going to be food and farming on foreign planets. Take Mars, with its minus 60 temperature and exceedingly rare atmosphere, so rare that the highest reaches of our stratosphere yet conquered have atmosphere one hundred times as dense.

Man will stand the cold without difficulty. Mars is exceedingly dry and 60 below zero is not uncomfortable in a dry climate. Twenty miles out of New York City the mercury has dipped nearly that low several times in recent years. Forty below is not unusual in the West. The Byrd Antarctic Expeditions lived for many months with temperatures ordinarily around that—and men skied without shirts on calm days!

BUT SOMETHING has bothered all expeditions into our polar wastes.

Diet. Even with every aid and all the knowledge of modern science, a slowly cumulative depression has usually overtaken men. In the Antarctic there are no natives for comparison, but in the Arctic the native Eskimo is a happy, intelligent human who lives largely on blubber and raw meat. White men visiting those regions have tried the nearest possible cooked diets. Where their diets were short on fruit and vegetable juices, they developed scurvy. Where their diets were as well rounded for their particular bodies as science could manage, they still were overcome by a gradual nervousness, or seriousness, which is not inherent to the natives of the polar area.

This has a very definite significance. The civilized scientist with his scientific diet is not as efficient a mechanism, in comparison, as the native Eskimo *under polar conditions*. Many generations have oriented the Eskimo to his bleak surroundings and theoretically wrong diet. Probably several generations would be necessary for white men from the south to orient themselves to the Eskimo diet. But even where white men have lived in the same regions for many generations, they do not surpass the Eskimo in intelligence and stamina to the extent which might be expected.

The first Earthmen to visit other planets will have a vastly greater orientation to go through. For many decades, their required work will be prodigious. It is not likely that foods which served them on Earth will completely meet the requirements of strange climates and intangible effects. It may be necessary for them to spend many years for orientation alone, and men other than scientists will not do this for achievement alone.

The only inducement to bring colonizers to planets will be a chance at fortune plus a backbone of self-sustenance—the opportunity to continue existence and family line if something goes

wrong; the opportunity to build and develop the planet if things go right.

At the outset, food has a triple value: to give men energy to work under tremendous changes; the guarantee of life and not starvation if contact with Earth is broken; the development, not the stripping, of the planet.

Food supplies, of course, will be carried. But we do not think these foods alone will meet physical and mental requirements. There is probably a plant life of some sort on most planets, but the human body will require time to orient itself to the digestion of such plants.

The answer is tank agriculture, the artificial production of Earth foods on other planets, combined with adaption of planet foods to Earth palates. Man will have the diet he is used to while learning to use planet food. Slowly and moderately he will eat a little more of the feed native to the planet which will, to some extent, compensate for the staggering body drains of a strange mode of life. In event that communication with Earth is lost for a time, man will be safe, have at least the requirements of living.

How vital this matter of emergency living is, may be imagined from our own Antarctic. Expeditions visiting these wastes, with all their radios, airplanes, complete apparatus for communication and transportation, prepare themselves to withstand four years of marooned life, though planning only a two-year stay. How much greater the chance that early planet expeditions may be cut off for a generation or more!

IT IS PROBABLE that there is flora on Mars. If there is animal life also, it is, in Earth measurements, almost motionless. The slowest of the sloths would be comparative lightning. It has either immense lungs or some breathing apparatus so efficient we cannot imagine its workings. It is living

on atmosphere approximately one-thousandth that of Earth. Very few Earthmen can live in atmosphere one-tenth the density of sea level!

The lush places, the gardens of Mars, would be the North and South poles with their nine-month summers. This was brought out in detail in one Astounding science article. The utter dryness of Mars is almost beyond conjecture. There is a hoarfrost at the two poles during the winter night. This is the nearest thing to rain the planet knows. Flora would necessarily be of a type which could absorb this frost as it melted in the early spring, drink it in greedily, for it would be its only dampness of the year.

There might be other flora requiring little or no moisture. We cannot conceive of such on Earth, but doubtless a Martian could not conceive of any animal wasting quarts of water daily. On any other part of Mars except the poles, flora would be immensely tough, might even contain some chemical heating plant of its own, for the daily fluctuation of temperature would be upward of 100 degrees!

Presumably, this flora would be tremendously tough, or infinitely delicate and dry. But we do not know this and it is highly uncertain to conjecture too much. Even a laboratory producing synthetic conditions might not tell us. We have such a laboratory to study the little matter of the human lung's reaction to carbon monoxide gas at altitudes above 14,000 feet. All we have learned from these experiments is that a synthetic test is usually very interesting—and wholly unreliable.

It is easier to work retroactively in nature than progressively. If we follow the natural laws witnessed on Earth that have to do with altitudes and depths, chemical content of earths, periods of rain and sun, etc., then the flora of Mars would be what we would call

low-type. It would be far easier to adapt Earth flora to Martian conditions than vice-versa.

The means would very likely be similar to the dirtless farming developed by Professors W. F. Gericke and Arthur C. Pillsbury in California. Professor Gericke grew 26 bushels of potatoes in a ten-foot tank, equivalent to about 2,600 bushels per acre. At that rate, a 9-mile square farm would supply all American spud-eaters with their annual quota with three crops per year!

Professor Gericke's "farms" were wooden tanks ten feet long, two and half feet wide and ten inches deep. The tanks were filled with water and covered with wire netting on which was spread a half-inch cover of shavings or excelsior. Into each tank goes a fertilizer unit—a bottle containing soluble salts of calcium, potassium, magnesium, iron, copper, manganese, nitrogen, phosphorus, sulfur, zinc and boron. Electric heating cables keep the tank at the desired temperature.

The professor has raised a hundred different crops by this means. Tobacco plants grew 20 feet tall; corn, tomatoes and other vegetables were giants and declared superior in every way to naturally grown prize produce.

HOWEVER, the professor's method employed natural sunlight and air. This would have to be compensated on Mars, the "farms" being covered tanks supplying extra light to make up for the weakened natural sunlight. With due care, there should be no blight, but there might be some danger of tank explosion at first, as it would require several generations to orient Earth plants to growth in rarer atmosphere and lower pressure. Whether the plants would explode or not on being taken from their artificial pressure culture is a moot point. Some deep-sea plants cannot even be brought to the water surface in-

tact, while others from as much as a mile and a half depth come up without any great alteration.

Adapting Martian plant life to human Earth palates would be accomplished by similar means. Rays, short waves and chemical dampness might stimulate the arid flora to much greater growth than Earth plants, or afflict them with a damp-rot. It seems logical, however, that food consumed by bodies living under artificial near-Earth pressure and air density would have to be grown at somewhere near the same pressure.

We don't know this for certain. We do know that animals and birds captured at a high altitude and fed on low altitude food—bugs and animals of the same families—usually die, while if fed on their native food they are likely to survive. The same applies to fish. Oddly, the body seems better able to adapt itself to new surroundings than does its digestive system and metabolism.

The difficult part of artificial culture of Martian plants for human digestion would be the danger of their getting too much oxygen and pressure. It would be far easier to grow Earth plants on Mars than vice-versa. But on Mars the lichen and extremely rooty growths of that planet could possibly be made to feel at home in the artificial pressure and ray and chemical farms in one tenth the time it would take to culture Earth plants to survive natural Martian conditions. All the changes for the Martian plants would be giving them more of their requirements for living.

These Martian plants would most likely be highly exotic in both appearance and flavor. They would be bursting with the wild riotous colors of the Painted Desert and highly spicy to taste. Ultimately, they would constitute a chief Martian export, a highly prized luxury food and condiment back on Earth. They might have important medicinal properties and be valuable for glandular treatment and blood building. Un-

doubtedly, they would have many chemical uses, dyes and scents immediately coming to mind. Their natural state would be of such complete dehydration that simply powdered, they would take the minimum of transport space.

There is little doubt that they would be almost vital over a period of time to human life on Mars. They would aid immensely the orientation of Earth bodies to Mars conditions, at least, by all the natural laws we know. Many localities of the world are devoid of important foods, but this is the result of floods, fires, or natural phenomena which have not been rectified. In any locality a healthy basis of diet is the food nature supplies there.

But in the case of human beings visiting Mars, there is the problem of an Earth body eating an absolutely foreign food. Martian conditions demand Martian energy and immunities, but Earth bodies demand Earth food. As a matter of probability, Earthmen would be allergic to some Martian plants at first. And yet equally probable, Earth foods alone, whether carried or grown on Mars, will not supply an orientating body with all necessities.

THE CHEMICAL TANK and scientific farming is the answer. With one set of tanks, Earth food will be grown to live and perpetuate itself on Mars. Another set of tanks will culture Martian flora to life under quasi-Earth conditions. As the plants are sped through generations, they will slowly develop some similar characteristics. Probably the high plateau cacti, some of which have considerable food content, and the high mountain lichens would be first to show adaptability to Mars. Likewise, the Martian plants would develop characteristics akin to the cacti first.

When the point arrives where the two may be crossed, interstellar explorers will offer a prayer. They will have a

food with the necessary properties of Earth, and with the additional native properties of Mars—just as Hubbard developed an animal with the beef and milk temperament characteristics of domestic cattle and the hardihood and immunity of the wild buffalo.

Conjure up a vision of what this means to planetary development. Not all men are born scientists, finding their entire life wrapped up in some knotty problem. They grow nervous and restless and subject to fears in strange places which scientists are too occupied to have. Yet the scientist without those men is liable to be lost. His very concentration on one problem may endanger his every-day living and survival.

After the scientist comes the miner, the soldier of fortune. But soldiers of fortune are notoriously moody and strictly speaking, highly unbalanced. Possibly more than any other group of men, they will take a risk for profit or adventure—but they also know the meaning of danger and they demand the

chance of survival. Fifty or a hundred million miles from home is considerable distance when there are no eats along the way!

Finally, there is the native instinct of race-survival deep in every man. The pioneer, the developer of a new land, is seldom the foot-loose type, wild west stories to the contrary. It is the family man who goes out and overcomes obstacles and sticks until success is won.

There are plenty of men in the world today who might risk that first planet colonization. But they would want their families, at least as soon as they got started. And space is too big a place to trust for food on transport schedule. They might dare extreme privation, a land without water, a land of vegetable diet, a land cold and extreme. But they would not chance a place without any food whatever.

The most important man in the universe to the Earth of interplanetary travel time will be another Luther Burbank.

TANK AGRICULTURE experiments have shown that inordinately large crops can be produced on tiny areas. Soil serves two main purposes to the plant; it acts as a support and supplies needed minerals. Wire screens covered with straw can take care of the first function; water solutions of minerals serve even better than soil in the second. Normally, the plant leeches the minerals present in the soil into a water solution, and actually absorbs that. Nutritionally, then, a water solution of minerals is its natural habitat.

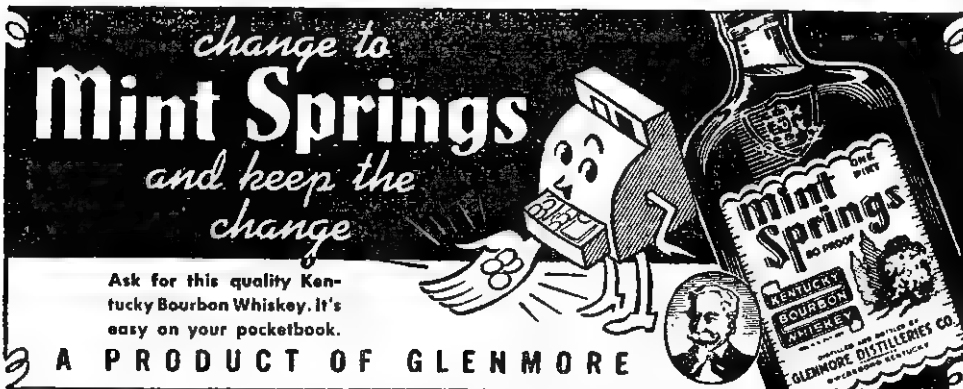
The mineral consumption of plants varies immensely, however. Such food-plants as potatoes, which consist almost entirely of carbohydrate material, manufacture their substance almost entirely from carbon dioxide and water. A few pounds of mineral substance dissolved in water will supply all the mineral nutriment for several tons of potatoes. The rest of the tuber's mass is extracted from the air and cheap water.

Wheat, on the other hand, is sold comparatively dry. It has a considerable nitrogen and mineral content which cannot be derived from air, but must be supplied in the mineral solution. Therefore, wheat is not an economic food for tank agriculture on Earth, since hundreds of pounds of minerals must be supplied for each ton of food-stuff.

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RESILIENT



The man, like his world, was rubbery! When he walked, he actually bounced!

BOB DIXON raised his aching head slowly from the metal floor. His brain was on fire, and his eyes couldn't register the surroundings clearly. He knew he must do something, though the slightest movement sent excruciating pains through his bruised head, and the top felt ready to drop off.

Broken pieces of the take off harness still hung around his shoulders, pulled by the terrific strain. The ends were

PLANET

by Warner Van Lorne

Picture a world where everything—buildings, machines, ground, even people—is rubbery!

still fastened to the metal frame of the control chair.

There had been only seconds to spare as the *Eagle* tore away from the small planetoid before the collision. The force of landing the ship had evidently started the rock moving, and it was luck that he saw the smash coming before it bumped the other sphere.

That take-off at full speed was too much for the old straps to stand. It was a wonder the space tramp had been able to stand the strain. But the old crate had done some fast traveling.

Then his smile faded. The fuel gauge had caught in his blurred sight to drive away all dizziness. It registered less than sixty pounds of *ronaline*!

He staggered to the tank in the hold, to examine that gauge. It registered the same! Once more he headed back for the cabin to shut off all power.

It was a long time before he raised his face from his hands. There wasn't enough fuel in the tanks to carry him back to any space port—and he was heading out!

The solar universe lay far behind, where the Sun appeared like a bright star. It was impossible to calculate the distance the ship had covered while the fuel burned at full power. There had been plenty to take him back to port with the small deposit of valuable *brock*. On this trip he had felt lucky—and this was his luck!

He didn't know where he was. Every star looked strange and different, and he must find some place to land before

many hours. Sixty pounds of *ronaline*! All that remained of nearly one ton of the precious fuel. He didn't even have equipment that could signal Earth for help. The *Eagle* was an old ship and only luck and a lot of labor kept it in condition to use.

Slowly his brain cleared. He wasn't licked! He'd find some way of getting back. Perhaps there was an inhabited globe within reachable distance. His eyes searched space ahead.

He had been at the very outer reaches of the Solar System and now was far beyond any charted space, beyond any hope of return without aid—and must keep on in the same direction! He couldn't stop the ship, turn it, and head back the way he had come. It wouldn't leave enough fuel to handle the ship and hold a set course. This way he might make a safe landing—if he found a place to land!

HE WAS heading directly toward a brilliant star which grew brighter with each passing hour. He ate several times, but his eyes didn't close again. He knew he must have lain unconscious for many hours—possibly many days—to cover the distance that had been traversed. He was afraid to figure how long it would take to consume that terrific amount of fuel. It seemed impossible!

Slowly, the brilliant star took shape, and solid globes appeared in a small system. One planet drew particular attention. *It had atmosphere!* Every test of the spectroscope proved it, and it

might be breathable.

Several times the blasts lighted for a moment, to reset the course, but the fuel gauge sank lower at each firing. Thirty-six pounds! It was hardly enough to make a safe landing. There *had* to be help ahead!

The small globe swung between the *Eagle* and its sun, as the ship approached. The little world turned very slowly on its axis, and Bob knew the nearest side would remain dark for many days of Earth time—possibly months. Movement was only just visible, although many hours passed before the ship reached the outer atmosphere.

The *Eagle* settled slowly through complete darkness. The blasts were holding it away from the surface, to make sure it was over solid ground. Bob's eyes ached from straining into the landing lights. Suddenly the ship touched, and bounced away from the surface. Then settled back to rest quietly.

For a long time the Earthman sat still. He was on an unknown planet without means of leaving. If he could breathe the air—he could live. If not, he had reached the end of the trail.

Slowly the fastenings of the port were loosened. He bit his lips as it swung open to allow the atmosphere to enter.

His heart was in his mouth. It was a toss-up as to whether he would live, or die from some terrible poison. His lungs burned slightly, but after an hour they became accustomed to the change. He could breathe normally!

After a good sleep he left the ship, heading into the darkness with a flashlight and gun. The sooner he found whether there were living beings on the little globe, the quicker he would know what he faced.

A few hundred feet from the ship he stumbled onto a road! It was paved with peculiar material, but no stranger than the ground he had been walking across. It was resilient, rebounding at every step. The surface of the highway

was tougher than the ground, but it was still not much harder than wet clay. He cursed it often and regularly as his legs ached from walking on the strange surface.

When Bob saw brilliant lights coming toward him on the highway, he tumbled off the edge to land on the softer surface. He had to move fast to avoid the car which passed so swiftly there was little but a vague blur.

It suddenly struck him that not a single sound had disturbed the silence since he left the *Eagle*! The planet was noiseless! The passing of the vehicle left a creepy sensation playing tag on his backbone. It was a phantom, passing in the dark!

The silence was getting on his nerves. It was like a deserted world, with the ghost car flashing by. Little of its shape was visible except that it was long and hung close to the ground. The lights were brilliant, but the occupants didn't appear to have noticed him—if there were occupants.

HE HAD BEEN walking for an hour when lights appeared from the direction the car had gone. He stayed on the road as the car came to a halt. The creepy sensation returned. When the door opened a *resilient* man jumped out! He actually *bounced* when he landed! His legs shortened, then gradually extended to raise his body back to normal position. A simple robe was his only clothing.

Bob could hardly believe the creature was alive. He appeared more like the image of a man that a child would mold in putty. But he seemed intelligent, and certainly the machine represented the work of a well-developed brain.

When he smiled his face appeared like a rubber ball with the side pushed in, causing a wrinkle in the heavy surface. But with all of his strange appearance, he had a man's features. His ears were large and stuck out straight from the

rounded head. But his eyes, nose, and mouth, were the same as any man's. Each strand of hair was thick and curled in heavy ringlets.

He watched the Earthman with as much interest as Bob displayed, but his examination was good-natured. Then a vibration, which at first seemed like the rhythm of a motor, penetrated to Dixon's eardrums. It sounded like the hum of a taut rubber band being snapped back and forth. The man was speaking!

The vehicle was standing on runners which dented the surface of the road several inches. Both front and back of the car slanted down to the runners, with a small enclosed section in the center. The lights were on top of the body, about five feet above the road, and lighted the paving for several hundred feet ahead.

When Bob entered the car, at the driver's motioned invitation, the step of the vehicle gave beneath his weight. A moment later, as they started forward, Bob could feel his hair try to stand up. The whole back of it sagged with his weight!

The small car picked up terrific speed, until they tore over the road faster than the Earthman had ever traveled on the ground. The machine seemed glued to the surface, and gave a feeling of security. The rubber-man handled it with perfect ease, and turned to grin at his passenger several times during the trip. The highway was without defect, and the vehicle had almost unlimited speed.

A slight glow appeared ahead and gradually changed to the lights of a large settlement. Until they were within a few miles, the lights remained below the horizon of the small world, then seemed to rise from the surface of the ground.

The little world was so close to its sun that it would receive intense rays, and Dixon was suddenly thankful that he landed on the darkened side—even

though it was necessity instead of choice!

His mind jerked back to the surroundings as the car entered the city. The Earthman could feel the whole vehicle sway front, then gradually settle back as it came to a stop.

None of the buildings were over six stories high. They stopped before one of the highest. In the bright light the rubber-man appeared greenish-yellow and slightly transparent. Yet upon closer examination his skin was opaque. Bob hadn't been able to see his coloring before.

Everything was of the same substance. The car, the streets, and the buildings were elastic. Even the largest structures bulged at the bottom, from the weight above.

Doorways sagged, and some of them slanted to the side. The windows were crooked. On the upper floors they were long, but toward the ground they had become short and stubby. The sight gave the Earthman a dizzy feeling, and he closed his eyes before looking a second time.

Bob reluctantly followed the rubber-man into the building and the floor sagged beneath their weight. At any moment he expected the whole structure to melt with them beneath it.

AS THEY walked up the resilient ramp, he wondered if the city was deserted. It was strange that a place which could house several thousand people would have *no* sign of life.

The clear material in the window openings sagged until it wrinkled at the bottom. Furniture and wall decorations were all affected by the general settling. Benches sagged at the center to nearly touch the floor.

They went back down through the building after the man collected a few belongings, but still there was no sign of life. When they reentered the car, Bob was completely baffled. They must be heading for some other settlement.

They stopped before a square post set at one side of the street, and the city behind them darkened; every light turned out by a single switch. They were evidently the last people to leave, and all power was shut off at their exit.

Hours passed while the small car tore over the road through the darkness. Several times the Earthman dozed off. The material of the conveyance was springy, and lulled him into peaceful slumber. Every time he awakened, the driver looked back with his broad grin.

When their speed hardly lessened at a curve, the car seemed to stretch sideways from the strain. Bob was wide-awake, and hanging on for dear life!

The driver grinned even wider, and took the next curve at terrific speed. Bob decided that he wouldn't display uneasiness again, but he couldn't help grabbing for the nearest solid section of the car—only to have *that* stretch toward him!

They had been traveling for many hours when lights appeared ahead, but the driver showed no sign of tiring. This city was brilliantly lighted, and the Earthman realized that the other settlement had had only a small portion of its lights turned on.

The streets were filled with rubber people, and the car drew between the buildings at a snail's pace. The women were decked with every kind of object. Little bright buttons were stuck in their hair, which curled the same as the men's. Their dress was colorful, and similar to a child's romper suit. The single plain robes of the men were a direct contrast.

They were like rubber dolls, with little round faces displaying perpetual good humor. The only other emotion their features registered was a pouty expression. But even that didn't appear to be displeasure.

When he climbed out of the small car, they crowded around. A humming sound came from many of the throats while

they grinned at sight of the stranger. Some children came running and bouncing down the street with laughter on their faces, and he grinned back. It was infectious.

The rubber-man led the way into one of the main buildings. It was in better condition than the structures of the deserted city, but there were some signs of sagging. The floors were resilient, but the clear panes in the windows remained smooth.

Everyone stopped to grin at the stranger. They seemed happy to see a human being, which was a matter for conjecture to Dixon. He knew they had never had intercourse with the Solar System. It was a new planet, unexplored by Earthmen.

After climbing up three stories on the sloping ramps, they entered a room with a rubber-man seated on a throne at the far end. He appeared the most congenial of any of the creatures and, at the Earthman's approach, grinned until his mouth tried to stretch from ear to ear.

Dixon jumped back—the man tried to rub his nose against Bob's cheek! Then regaining his poise, he stuck his face forward to rub *his* nose against the face of the ruler. He couldn't help but think how much it felt like a rubber ball.

THE STRANGER was accepted as an honored guest, and given the best of food. His living quarters were in the building with the ruler, but the inaction got on his nerves. He couldn't talk to anyone, and couldn't wander about as he pleased. They took him sightseeing, but wouldn't allow him to go alone.

It pleased them immensely when he tried to imitate their vocal sounds, and the ruler appointed a man to instruct him. At first, everything sounded alike, but he slowly learned to repeat many of the words. They didn't understand his language, and it never entered his mind to voice anything in English.

He must learn how to make his wishes

known before he could explain what chemicals were required as fuel for the *Eagle*. Even then it would be hard to describe the spot where he had left the ship.

They had mastered many intricacies of science in a world without hard substance; using electricity for every purpose. Even the road-cars were driven by magnetism. There was not a single rotating part in any of the machinery. The wheel, a basis of Earth-civilization, was unknown.

They gave Bob every delicacy, but he grew thin on food that reminded him of rubber-cement. It was too much like chewing gum to be appetizing because the flora of the planet was resilient in its botanic formations. He did enjoy the clear and tasteless water.

One month passed, then a second, as Bob judged from the number of times he slept. With constant darkness, it was impossible to keep an accurate check. In the direction of the deserted city a faint glow began to show in the sky. It was only a short time before sunrise, and he awaited sight of the bright ball with longing.

Recently, the buildings had begun to sag like those in the deserted city, and the natives hurried about their business with renewed vigor, as if expecting some great event.

Finally Bob was awakened from a sound sleep by a rubber-man shaking him. He was hurried down a ramp to enter a car at the entrance. Before Dixon understood what was happening they were speeding along the road beyond the city. Away from the glow in the sky!

The road was crowded with cars, all traveling in the same direction. A general exodus from the city—before the sun touched it with the terrific heat!

The rubber-men constantly ran away from the bright disc. They couldn't stand the rays of their own sun! Roads completely circled the planet, with cities

at intervals where they could live for a few months. The race had become migratory to overcome the slowly rising temperature as their world swung nearer the sun, and they lived the only possible life under the planetary conditions.

Bob slept several times, and they stopped twice to eat during the trip. He knew they had come a long distance, but didn't realize quite how far until the sky ahead answered.

They were *facing* the same glow that had been in the *opposite direction* when they left the city. The trip had carried them almost halfway around the globe!

The new city was much larger than the one they deserted, and accommodated people from many of the cities in the other zone. There were manufacturing plants of every type, and industries that the other cities lacked. The main work of the planet was carried on in this central spot, where they spent more time than anywhere else.

Every member of the race gathered here, where the rubber-men had little time for the pleasures enjoyed during other sojourns. Half of the population labored in fields for many miles around the city, harvesting crops that were already ripened.

As soon as the fields were cleared, they were planted again, and Bob watched the operation with interest. During the time they spent in the capital, they carried on every branch of agriculture. The ripened crops were harvested, to be replaced by new seedings. These were left for the effect of the sun, which carried their development to completion before the population returned during the next dark period.

THE BUILDINGS of the city were in perfect condition, yet they appeared to have stood for centuries of Earth time. Bob examined many of the structures, without finding the slightest defect.

One group of workers was busy over-

hauling the road-cars, which were all-important to their existence. Other men worked on machinery brought from the deserted cities, to be returned in good condition upon their next trek.

There were nearly a million inhabitants in the capital, as every being on the globe was concentrated here during its occupation. They were distributed among several cities at every other season.

Even during the time they were carrying on the work to provide for many months, a rubber-man constantly accompanied Bob. He wasn't allowed to roam the city, but was taken by routes which avoided all main thoroughfares. At first he paid no attention, but it piqued his curiosity.

He was gaining a conversational knowledge of the language, and could talk to his guide. But once he made the mistake of calling to the man in a natural voice.

It was the first loud sound Bob had heard on the planet, and the results were phenomenal. The sound didn't echo or reverberate, but died out in silence a moment after he spoke. He noticed that the wall of the room was shaking violently, as if affected by an earthquake—and the rubber-man lay *unconscious* on the floor! In the world without sound, his voice was dangerous!

It was several minutes before the rubber-man regained consciousness and sat up without realizing what happened. He grinned sheepishly at the Earthman, as if he had slumped to the floor asleep.

When the wall of the room stopped shaking, Bob sighed in relief. The sound of his voice was too powerful for the resilient planet, as every vibration of their world was below even a normal speaking voice.

One day, while riding through the city, Bob jumped in amazement. He thought for a moment the occupant of another car was a human being. He

must have been mistaken! It was only a fleeting glimpse—yet his mind kept returning to that half-seen face. It stood out as no other since he had been with the rubber-men.

When he questioned his driver the man was so upset that he almost lost control of the car, and his grin entirely disappeared! Then he denied it so profusely that it raised suspicion. Perhaps there was more to that section of the city from which Bob was barred than he had thought? He decided to find out in some way.

After that incident he was allowed even less freedom. The suspicion that another of his race was on the same planet became almost conviction, although he could think of no reason for their hiding the fact. Why shouldn't they allow him to meet this stranger?

The people were so friendly it seemed improbable they would keep two members of another race separated. Certainly the man in the other machine didn't know of his arrival, or he would have come searching—if he could!

In an alien universe seeing a man of one's own kind was a great event. Twice, while prospecting on some strange sphere, Bob had met men and each time there had been a celebration. Neither asked about the other's origin; both were satisfied to meet their kind without question.

The longer he was kept under strict surveillance, the more discontented the Earthman became. He learned to almost hate the unchanging expressions of the rubber-men.

THEN SUSPICION was forgotten in the search for fuel for the spaceship. His mastery of the language was sufficient so he could enter their laboratories and study every process of manufacture. When he found nothing that might replace *ronaline* his hopes turned to despair. When it came time

for the exodus from the city he was still searching for the secret.

He had learned to handle the small cars and could drive with confidence. Their operation was simple and almost trouble-free. They represented centuries of development, as the resilient materials of the small world had many drawbacks which did not exist on the solid planets.

Discovery of one element had given them mastery of mechanics. This chemical dissolved one of the standard minerals, creating enormous quantities of electric energy in the process. The two radicals, in combination, created a force which strove to push the car away from the surface. With the power released at the back of the vehicle, it moved forward at terrific speed.

The sun had begun to light the sky behind. It was time to move on in the constant march with the darkened side of the world. He took turns driving as the populace headed for the next city.

During the time they remained in the capital the buildings began to sag. By the time of departure they were in the same softened condition as those in the other cities at the moment of migration. While traveling, Dixon received the first explanation of the phenomenon from his companion.

During the dark period, the planet absorbed moisture. It rained quite often, and the building material acted like a sponge. While the cities were deserted beneath the heat of the near-by sun, the surface dried out again. With the evaporation of moisture, everything regained its original shape.

Dixon shook his head hopelessly. He understood what took place, but couldn't understand *how*. Upon first acquaintance with the globe he thought synthetic rubber could be manufactured from the natural resources, but had found the composition useless. He couldn't help but think what a mess the little world would be if the sun didn't shine for one period.

For once in his life Bob had enough traveling. Always before he had kept on the move because of desire. Now that it was forced upon him, the pleasure was gone. He dreamed of the time when he could stay in one spot for months, without having to run away from the sun. The day he sighted the Earth again would be the happiest moment of his life—if he ever did!

A feeling of hopelessness crept over him. They had to move so often there wasn't time to develop a new chemical in the laboratories. It would require a lifetime of effort to accomplish what might be done in one year on Earth. He felt sorry for these beings who had to move constantly, yet they seemed to look forward to migration with pleasure—and they knew no other life. They were happy!

He passed many cars that were loaded more heavily, while some vehicles passed them. Bob recognized the car of the ruler as it passed. Their own machine carried a load of heavy machinery which made it slower. He was a regular inhabitant of the planet now, and helped with the work. It was a world where everyone labored, which partly explained their good nature.

As a glow appeared on the instrument panel another car streaked by. Every other vehicle moved aside to give it room. As it passed, Bob glanced up. Then he gasped! It was the human being again—driving alone! His mouth almost dropped open. *It was a woman!* The headlights of their machine lighted the interior for a moment and he had a plain view of the occupant.

HE TRIED desperately to get more speed from the machine he was driving, but instead of accelerating, it slowed down. He was shouting! The rubberman was unconscious from the vibration of the Earthman's voice! The whole car was shaking. It wobbled and swayed

until it required every ounce of Dixon's energy to keep from smashing into another car. The girl was gone.

It was an hour before the native regained consciousness. He didn't know what had taken place, but grinned good-naturedly as if he had fallen asleep for a few minutes. The car had stopped vibrating and was operating perfectly again. It was on the tip of Bob's tongue to hum to the rubber-man about the girl, but his lips remained sealed. He could do more if his knowledge remained a secret.

They entered a city which might house 100,000 people, but nothing in comparison to the capital. The machinery in the car was for use in the power building, and the Earthman helped install it.

He was given complete freedom, which made him think the girl must be somewhere else. There was no way of telling where she might be, as he didn't know the location of the other cities.

He couldn't understand why they wanted to keep him from knowing that the girl lived among them. Perhaps they were jealous of one of her own race, and were afraid he would try to take her away—which he fully intended to do! He would find a way of escaping from the little globe.

Little communication existed between the cities. The people were content to wait for news until they returned to the capital. It seemed hopeless to try and locate the girl until the population again assembled all in the same place.

One day Dixon was looking through the clear pane in the front of his sleeping quarters when a car came racing down the street. He still occupied an apartment in the building with the ruler, and knew it must be an emissary from some other city. It broke the monotony, so he hurried toward the ramp, interested.

Three of the rubber-men came running, to usher him back to his room.

This move flashed the answer—the girl had come!

Looking out again, much against the will of the three natives, he examined the car carefully. It had fast lines and might be the same machine that had passed him on the road. It was certainly specially built.

When he turned to look at the good-natured grins of his guards, they appeared almost worried. He was going to see who came in that car if it meant declaring war against the whole race. He shouted.

The three men sank to the floor unconscious, their grins still in place. The vibration of his voice caused instant slumber. The room shook violently. He didn't wait to see the effect, but headed toward the throne room.

At the doorway he hesitated as four rubber-men ran toward him. He wasn't certain that he was discovered, but they must have felt the vibration of the upper floor. The girl faced the ruler. It made Bob smile to see her shake her finger in the man's face—and the ruler didn't appear very happy!

Dixon was afraid of what might happen if he was seen, and shouted again. The ruler slid to the floor, while the men who had been coming toward him rolled up like balls and bounced along the resilient surface. He and the girl stood facing each other—her expression one of disbelief.

When he walked forward, she staggered back and the color drained from her face. She seemed almost afraid, and glanced around in a daze. Suddenly she slumped to the floor in a faint.

A MOMENT LATER he was hurrying down the ramp with her limp form in his arms. Twice, rubber-men tried to stop them, and he left them unconscious from a shout. He was going to get the girl alone, where they could talk.

Before any more natives caught up,

the fast car was racing through the city while people tumbled out of the way. Nothing could catch them if they had a start.

Lights of other cars appeared on the road behind, but he drove like a maniac in the direction of the next city to be occupied. The girl might know a safe place to spend a few hours.

There were supplies in the *Eagle*, and if he could locate it they would be able to hide as long as necessary. The searchlight of the car would reflect on the metal, as it wasn't far from the highway. He believed it was not many miles from this city.

There was a vaguely familiar feeling to the road, and he slowed down. The light shone across the level ground for several hundred feet, but a long time passed before he dared hope they were in the section with the spaceship.

The girl had regained consciousness, and sat staring at him in undisguised wonder, too startled to return his smile of friendship. She was young, with dark hair and fair skin. She would have been beautiful on Earth, and to the spaceman she was more than that. Her environment had given her a slightly different appearance than girls accustomed to the culture of their own race. Her face was strong, yet she had acquired some of the humor of the rubber-men.

At last she asked Bob where they were going, using the humming language of the natives. He replied as best he could, describing the *Eagle* as if she had never heard of a spaceship. Her reply surprised him.

"I, too, came in a hard-shell boat, when I was a little girl. These people have brought me up, and told me that I was a child of the skies. That I was the only one of my kind who was ever born, and must live amongst them always. Are you, too, a child of the stars?"

Bob was so taken back that he remained silent for several minutes. Bright

lights seemed to race through his brain, as the possibility of her identity seeped into his mind. After so long, was it possible that he had stumbled onto Burk's daughter? It was out of all reason, but still —?

His mind went back to an event that happened twelve years before, when he was seventeen. The Martian liner, the piracy, and the heroism of the officers stood out as if it had taken place the day before.

Doris Burk was being returned to Earth on that disastrous voyage. As she was the only daughter of the President of Interplanetary, every paper carried the news.

For over a month the ship was missing, while every observatory searched frantically for some trace. Then the report of radio signals, picked up by a space tramp, reached civilization, to cause consternation throughout the universe.

Piracy had broken out on board! The ship had been driven far from the standard space lanes, while the officers were barricaded in the main cabin with the seven-year-old girl.

The space tramp required three weeks to reach a position where they could send the news on, with their weak equipment. Five weeks passed, after the crew captured the ship, before the universe knew about it.

The officers had already cast the child adrift in a lifeship to keep her from falling into the hands of the mutineers. They could not spare a single member of their group to accompany her, but set the course of the small vessel for Mars, under the automatic pilot.

When the child was gone they fought their way to the radio room and sent forth the news, expecting the small ship would be picked up by searchers.

ONLY TWO of the men reached the room alive, but they contacted the space tramp before the crew broke through

the door. They, knowing they were doomed, had prepared a reception for the mutineers.

A small bottle of liquid was grasped tight in the fingers of one man, the barrel of a gun held against it. When his body was hit by the first bullet he pulled the trigger. It was the most powerful explosive known to the system—and there was no longer a Martian liner. The officers had ended the mutiny.

The lifeship had every available space crammed with food and water for the child, to cover any emergency. Hundreds of ships cruised space in the search, but no sign of the craft was found. Doris had either moved the controls, or the automatic pilot didn't work properly.

Months slipped by and turned into years. John Burk died after seven years of vain hoping, but he made sure the search would never be forgotten. His total fortune was left in trust. One quarter as a reward for information about what had become of his daughter—and half the total fortune for her safe return to civilization.

Suddenly Bob Dixon turned to the girl.

"Doris!"

At the sound of his voice she jumped violently. Then looked at him with wide eyes. For a long time there was silence, while her forehead puckered in deep thought.

"What—do—you—want?"

The words came slowly, as something almost forgotten. But she still vaguely remembered the language of her childhood. Bob spoke slowly, in English, so that she might understand the words. His tone was low to stop some of the vibrating of the car.

"I came after you, Doris. For many years we have searched. They want you at home where you will have every happiness. There are many people like you and me, and you will have many friends.

You will be happy, and have a family of your own."

She hummed her next question, as if she couldn't recall the words in English.

"Did you come to be my mate? I haven't one. Until I saw you I thought I would never find a mate of my own. The other men don't suit me, and I wouldn't have one. But they tried to keep you away from me. I know, because the ruler sent me to another city."

When a glint appeared in the searchlight, Bob's mind jerked back to the road. It was the *Eagle*. Nothing else on the planet would reflect that way.

The car swung to the edge of the pavement, then stopped. The surface of the road seemed to control its operation, but he increased the power to the utmost. Slowly it moved off the edge, and started across the softer surface. The electric energy was being consumed at an alarming rate, but they picked up a little speed.

The girl wandered through the *Eagle*, examining everything in wonder. It was beautiful and strange. She tried the bunks, and examined the control board. It was a new world, within the hull of a space tramp.

When Bob explained the trouble with his ship she was disappointed. She had expected to leave the small world without delay. He had come for her, and she took it for granted that she was to become his mate. He dared not tell her otherwise for fear it would upset her desire for return to Earth.

"The small ship I came in has a tank full of black stuff, Bob. Do you think we could use that?"

FOR A MOMENT his heart jumped, then it sank again. The amount of fuel on a lifeship would never drive the *Eagle* to the Solar System. It would hardly carry it across the miniature universe, without covering the millions of space miles.

When he learned that the ship was in

the capital city, he gave up all hope. They couldn't reach it during the daylight season, and the rubber-men inhabited it at all other times. They would have to obtain help from the natives.

When they reappeared in the city, the rubber-men greeted them with grins as broad as ever. They were like children, caught being naughty. The ruler was very much upset at the scolding he received from Doris, and acted as if he would like to hide. They worshipped the girl, and were naively ashamed of the way they had acted.

Bob showed the rubber-men a sample of fuel from the *Eagle*. They didn't recognize it, though he suspected that they feigned ignorance. The only chance of escape was the fuel in the lifeship.

Doris informed the rubber-men Bob was to be her mate, and displayed him proudly. Lack of a companion of her own race had preyed on her mind, and she was making up for it.

When they migrated to the central city Bob headed for the small ship immediately. It had been stored in a museum in the center of the metropolis, and he found everything undisturbed. The automatic controls had landed it, but the rubber-men found the child almost starved to death. The trip through space had been long and the supply of food was gone long before it reached the resilient planet.

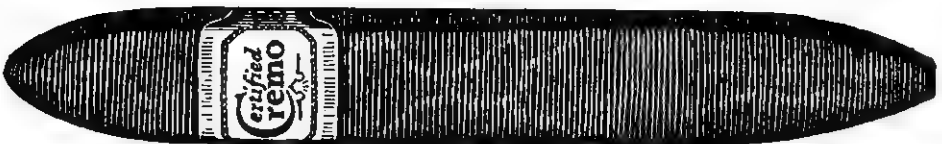
It was a three-passenger ship, with very cramped quarters. But the fuel tank was two-thirds full! There was not enough to drive the *Eagle* back to Earth, but the small ship had ample for the trip.

Doris was anxious to leave the little world, and danced with glee when Bob said they could use her ship. But she wouldn't go until he promised to bring her back again to visit the people she had always known. They were strange and different, but they had brought her up as their own child.

The rubber-men were disappointed when they found that the human beings could leave, but happy when Doris promised to return. They didn't believe it possible to control the people from the stars. They were considered deities who could do as they pleased.

The small ship was carried far out on the plain, where the vibration of the blasts wouldn't affect the city. Bob was afraid the explosions might leave serious effects. He waited until every bouncing native had returned to the capital, before taking off.

A long hazardous trip lay ahead, but Dixon was light-hearted. There was hardly room to move, as food and water filled every available space. It was a long gamble as to whether they would ever reach a civilized port—but they were headed for *home*!



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"Who Goes There?"

by Don A. Stuart

*Who—is that your closest friend—or a monstrous
imitation, breed of an alien, deadly world?*

WHO GOES THERE—?



*The monster changed as they looked. Three blinded eyes bubbled and
crawled hideously in feral hate—growing—seeking sight again—*



THE place stank. A queer, mingled stench that only the ice-buried cabins of an Antarctic camp knew, compounded of reeking human sweat, and the heavy, fish-oil stench of melted seal blubber. An overtone of liniment combatted the musty smell of sweat-and-snow-drenched furs. The acrid odor of burnt cooking fat, and the

animal, not-unpleasant smell of dogs, diluted by time, hung in the air.

Lingering odors of machine oil contrasted sharply with the taint of harness dressing and leather. Yet, somehow, through all that reek of human beings and their associates—dogs, machines and cooking came another taint. It was a queer, neck ruffling thing, a faintest sug-

gestion of an odor alien among the smells of industry and life. And it was a life-smell. But it came from the thing that lay bound with cord and tarpaulin on the table, dripping slowly, methodically onto the heavy planks, dank and gaunt under the unshielded glare of the electric light.

Blair, the little bald-pated biologist of the expedition, twitched nervously at the wrappings, exposing clear, dark ice beneath and then pulling the tarpaulin back into place restlessly. His little birdlike motions of suppressed eagerness danced his shadow across the fringe of dingy gray underwear hanging from the low ceiling, the equatorial fringe of stiff, graying hair around his naked skull a comical halo about the shadow's head.

Commander Garry brushed aside the lax legs of a suit of underwear, and stepped toward the table. Slowly his eyes traced around the rings of men sardined into the Administration Building. His tall, stiff body straightened finally, and he nodded. "Thirty-seven. All here." His voice was low, yet carried the clear authority of the commander by nature, as well as by title.

"You know the outline of the story back of that find of the Secondary Pole Expedition. I have been conferring with Second-in-Command McReady, and Norris, as well as Blair and Dr. Copper. There is a difference of opinion, and because it involves the entire group, it is only just that the entire Expedition personnel act on it.

"I am going to ask McReady to give you the details of the story, because each of you has been too busy with his own work to follow closely the endeavors of the others. McReady?"

Moving from the smoke-blued background, McReady was a figure from some forgotten myth, a looming, bronze statue that held life, and walked. Six-foot-four inches he stood as he halted beside the table, and with a characteristic glance upward to assure himself of

room under the low ceiling beams, straightened. His rough, clashingly orange windproof jacket he still had on, yet on his huge frame it did not seem misplaced. Even here, four feet beneath the drift-wind that droned across the antarctic waste above the ceiling, the cold of the frozen continent leaked in, and gave meaning to the harshness of the man. And he was bronze—his great red-bronze beard, the heavy hair that matched it. The gnarled, corded hands gripping, relaxing, gripping and relaxing on the table planks were bronze. Even the deep-sunken eyes beneath heavy brows were bronzed.

Age-resisting endurance of the metal spoke in the cragged heavy outlines of his face, and the mellow tones of the heavy voice. "Norris and Blair agree on one thing; that animal we found was not—terrestrial in origin. Norris fears there may be danger in that; Blair says there is none.

"BUT I'll go back to how, and why we found it. To all that was known before we came here, it appeared that this point was exactly over the South Magnetic Pole of Earth. The compass does point straight down here, as you all know. The more delicate instruments of the physicists, instruments especially designed for this expedition and its study of the magnetic pole, detected a secondary effect, a secondary, less powerful magnetic influence about 80 miles south-west of here.

"The Secondary Magnetic Expedition went out to investigate it. There is no need for details. We found it, but it was not the huge meteorite or magnetic mountain Norris had expected to find. Iron ore is magnetic, of course; iron more so—and certain special steels even more magnetic. From the surface indications, the secondary pole we found was small, so small that the magnetic effect it had was preposterous. No magnetic material conceivable could have that effect.

Soundings through the ice indicated it was within one hundred feet of the glacier surface.

"I think you should know the structure of the place. There is a broad plateau, a level sweep that runs more than 150 miles due south from the Secondary station, Van Wall says. He didn't have time or fuel to fly farther, but it was running smoothly due south then. Right there, where that buried thing was, there is an ice-drowned mountain ridge, a granite wall of unshakable strength that has dammed back the ice creeping from the south.

"And four hundred miles due south is the South Polar Plateau. You have asked me at various times why it gets warmer here when the wind rises, and most of you know. As a meteorologist I'd have staked my word that no wind could blow at -70 degrees—that no more than a 5-mile wind could blow at -50 —without causing warming due to friction with ground, snow and ice and the air itself.

"We camped there on the lip of that ice-drowned mountain range for twelve days. We dug our camp into the blue ice that formed the surface, and escaped most of it. But for twelve consecutive days the wind blew at 45 miles an hour. It went as high as 48, and fell to 41 at times. The temperature was -63 degrees. It rose to -60 and fell to -68 . It was meteorologically impossible, and it went on uninterruptedly for twelve days and twelve nights.

"Somewhere to the south, the frozen air of the South Polar Plateau slides down from that 18,000 foot bowl, down a mountain pass, over a glacier, and starts north. There must be a funneling mountain chain that directs it, and sweeps it away for four hundred miles to hit that bald plateau where we found the secondary pole, and 350 miles farther north reaches the Antarctic Ocean.

"It's been frozen there since Antarctica froze twenty million years ago.

There never has been a thaw there.

"Twenty million years ago Antarctica was beginning to freeze. We've investigated, though and built speculations. What we believe happened was about like this.

"Something came down out of space, a ship. We saw it there in the blue ice, a thing like a submarine without a conning tower or directive vanes, 280 feet long and 45 feet in diameter at its thickest.

"Eh, Van Wall? Space? Yes, but I'll explain that better later." McReady's steady voice went on.

"It came down from space, driven and lifted by forces men haven't discovered yet, and somehow—perhaps something went wrong then—it tangled with Earth's magnetic field. It came south here, out of control probably, circling the magnetic pole. That's a savage country there, but when Antarctica was still freezing it must have been a thousand times more savage. There must have been blizzard snow, as well as drift, new snow falling as the continent glaciated. The swirl there must have been particularly bad, the wind hurling a solid blanket of white over the lip of that now-buried mountain.

"THE SHIP struck solid granite head-on, and cracked up. Not every one of the passengers in it was killed, but the ship must have been ruined, her driving mechanism locked. It tangled with Earth's field, Norris believes. No thing made by intelligent beings can tangle with the dead immensity of a planet's natural forces and survive.

"One of its passengers stepped out. The wind we saw there never fell below 41, and the temperature never rose about -60 . Then—the wind must have been stronger. And there was drift falling in a solid sheet. The *thing* was lost completely in ten paces." He paused for a moment, the deep, steady voice giving way to the drone of wind

overhead, and the uneasy, malicious gurgling in the pipe of the galley-stove.

Drift—a drift-wind was sweeping by overhead. Right now the snow picked up by the mumbling wind fled in level, blinding lines across the face of the buried camp. If a man stepped out of the tunnels that connected each of the camp buildings beneath the surface, he'd be lost in ten paces. Out there, the slim, black finger of the radio mast lifted 300 feet into the air, and at its peak was the clear night sky. A sky of thin, whining wind rushing steadily from beyond to another beyond under the licking, curling mantle of the aurora. And off north, the horizon flamed with queer, angry colors of the midnight twilight. That was spring 300 feet above Antarctica.

At the surface—it was white death. Death of a needle-fingered cold driven before the wind, sucking heat from any warm thing. Cold—and white mist of endless, everlasting drift, the fine, fine particles of licking snow that obscured all things.

Kinner, the little, scar-faced cook, winced. Five days ago he had stepped out to the surface to reach a cache of frozen beef. He had reached it, started back—and the drift-wind leapt out of the south. Cold, white death that streamed across the ground blinded him in twenty seconds. He stumbled on wildly in circles. It was half an hour before rope-guided men from below found him in the impenetrable murk.

It was easy for man—or *thing*—to get lost in ten paces.

"And the drift-wind then was probably more impenetrable than we know." McReady's voice snapped Kinner's mind back. Back to welcome, dank warmth of the Ad Building. "The passenger of the ship wasn't prepared either, it appears. It froze within ten feet of the ship.

"We dug down to find the ship, and our tunnel happened to find the frozen

—animal. Barclay's ice-ax struck its skull.

"When we saw what it was, Barclay went back to the tractor, started the fire up and when the steam pressure built, sent a call for Blair and Dr. Copper. Barclay himself was sick then. Stayed sick for three days, as a matter of fact.

"When Blair and Copper came, we cut out the animal in a block of ice, as you see, wrapped it and loaded it on the tractor for return here. We wanted to get into that ship.

"We reached the side and found the metal was something we didn't know. Our beryllium-bronze, non-magnetic tools wouldn't touch it. Barclay had some tool-steel on the tractor, and that wouldn't scratch it either. We made reasonable tests—even tried some acid from the batteries with no results.

"They must have had a passivating process to make magnesium metal resist acid that way, and the alloy must have been at least 95% magnesium. But we had no way of guessing that, so when we spotted the barely opened lock door, we cut around it. There was clear, hard ice inside the lock, where we couldn't reach it. Through the little crack we could look in and see that only metal and tools were in there, so we decided to loosen the ice with a bomb.

"WE HAD decanite bombs and thermite. Thermite is the ice-softener; decanite might have shattered valuable things, where the thermite's heat would just loosen the ice. Dr. Copper, Norris and I placed a 25-pound thermite bomb, wired it, and took the connector up the tunnel to the surface, where Blair had the steam tractor waiting. A hundred yards the other side of that granite wall we set off the thermite bomb.

"The magnesium metal of the ship caught, of course. The glow of the bomb flared and died, then it began to flare again. We ran back to the tractor, and gradually the glare built up. From

where we were we could see the whole ice-field illuminated from beneath with an unbearable light; the ship's shadow was a great, dark cone reaching off toward the north, where the twilight was just about gone. For a moment it lasted, and we counted three other shadow-things that might have been other—passengers—frozen there. Then the ice was crashing down and against the ship.

"That's why I told you about that place. The wind sweeping down from the Pole was at our backs. Steam and hydrogen flame were torn away in white ice-fog; the flaring heat under the ice there was yanked away toward the Antarctic Ocean before it touched us. Otherwise we wouldn't have come back, even with the shelter of that granite ridge that stopped the light.

"Somehow in the blinding inferno we could see great hunched things, black bulks lowing, even so. They shed even the furious incandescence of the magnesium for a time. Those must have been the engines, we knew. Secrets going in blazing glory—secrets that might have given Man the planets. Mysterious things that could lift and hurl that ship—and had soaked in the force of the Earth's magnetic field. I saw Norris' mouth move, and ducked. I couldn't hear him.

"Insulation—something—gave way. All Earth's field they'd soaked up twenty million years before broke loose. The aurora in the sky above licked down, and the whole plateau there was bathed in cold fire that blanketed vision. The ice-ax in my hand got red hot, and hissed on the ice. Metal buttons on my clothes burned into me. And a flash of electric blue seared upward from between the granite wall.

"Then the walls of ice crashed down on it. For an instant it squealed the way dry-ice does when it's pressed between metal.

"We were blind and groping in the

dark for hours while our eyes recovered. We found every coil within a mile was fused rubbish, the dynamo and every radio set, the earphones and speakers. If we hadn't had the steam tractor, we wouldn't have gotten over to the Secondary Camp.

"Van Wall flew in from Big Magnet at sun-up, as you know. We came home as soon as possible. That is the history of—that." McReady's great bronze beard gestured toward the thing on the table.

II.

BLAIR stirred uneasily, his little, bony fingers wriggling under the harsh light. Little brown freckles on his knuckles slid back and forth as the tendons under the skin twitched. He pulled aside a bit of the tarpaulin and looked impatiently at the dark ice-bound thing inside.

McReady's big body straightened somewhat. He'd ridden the rocking, jarring steam tractor forty miles that day, pushing on to Big Magnet here. Even his calm will had been pressed by the anxiety to mix again with humans. It was lone and quiet out there in Secondary Camp, where a wolf-wind howled down from the Pole. Wolf-wind howling in his sleep—winds droning and the evil, unspeakable face of that monster leering up as he'd first seen it through clear, blue ice, with a bronze ice-ax buried in its skull.

The giant meteorologist spoke again. "The problem is this. Blair wants to examine the thing. Thaw it out and make micro slides of its tissues and so forth. Norris doesn't believe that is safe, and Blair does. Dr. Copper agrees pretty much with Blair. Norris is a physicist, of course, not a biologist. But he makes a point I think we should all hear. Blair has described the microscopic life-forms biologists find living, even in this cold and inhospitable place. They freeze every winter, and thaw

every summer—for three months—and live.

"The point Norris makes is—they thaw, and live again. There must have been microscopic life associated with this creature. There is with every living thing we know. And Norris is afraid that we may release a plague—some germ disease unknown to Earth—if we thaw those microscopic things that have been frozen there for twenty million years.

"Blair admits that such micro life might retain the power of living. Such unorganized things as individual cells can retain life for unknown periods, when solidly frozen. The beast itself is as dead as those frozen mammoths they find in Siberia. Organized, highly developed life-forms can't stand that treatment.

"But micro-life could. Norris suggests that we may release some disease-form that man, never having met it before, will be utterly defenseless against.

"Blair's answer is that there may be such still-living germs, but that Norris has the case reversed. They are utterly non-immune to man. Our life-chemistry probably——"

"Probably!" The little biologist's head lifted in a quick, birdlike motion. The halo of gray hair about his bald head ruffled as though angry. "Heh. One look——"

"I know," McReady acknowledged. "The thing is not Earthly. It does not seem likely that it can have a life-chemistry sufficiently like ours to make cross-infection remotely possible. I would say that there is no danger."

McReady looked toward Dr. Copper. The physician shook his head slowly. "None whatever," he asserted confidently. "Man cannot infect or be infected by germs that live in such comparatively close relatives as the snakes. And they are, I assure you," his clean-shaven face grimaced uneasily, "*much* nearer to us than—*that*."

VANCE NORRIS moved angrily. He was comparatively short in this gathering of big men, some five-feet-eight, and his stocky, powerful build tended to make him seem shorter. His black hair was crisp and hard, like short, steel wires, and his eyes were the gray of fractured steel. If McReady was a man of bronze, Norris was all steel. His movements, his thoughts, his whole bearing had the quick, hard impulse of a steel spring. His nerves were steel—hard, quick-acting—swift corroding.

He was decided on his point now, and he lashed out in its defense with a characteristic quick, clipped flow of words. "Different chemistry be damned. That thing may be dead—or, by God, it may not—but I don't like it. Damn it, Blair, let them see the monstrosity you are petting over there. Let them see the foul thing and decide for themselves whether they want that thing thawed out in this camp.

"Thawed out, by the way. That's got to be thawed out in one of the shacks to-night, if it is thawed out. Somebody—who's watchman to-night? Magnetic—oh, Connant. Cosmic rays to-night. Well, you get to sit up with that twenty-million-year-old mummy of his.

"Unwrap it, Blair. How the hell can they tell what they are buying, if they can't see it? It may have a different chemistry. I don't care what else it has, but I know it has something I don't want. If you can judge by the look on its face—it isn't human so maybe you can't—it was annoyed when it froze. Annoyed, in fact, is just about as close an approximation of the way it felt as crazy, mad, insane hatred. Neither one touches the subject.

"How the hell can these birds tell what they are voting on? They haven't seen those three red eyes, and that blue hair like crawling worms. Crawling—damn, it's crawling there in the ice right now!

"Nothing Earth ever spawned had the

unutterable sublimation of devastating wrath that thing let loose in its face when it looked around his frozen desolation twenty million years ago. Mad? It was mad clear through—searing, blistering mad!

"Hell, I've had had dreams ever since I looked at those three red eyes. Nightmares. Dreaming the thing thawed out and came to life—that it wasn't dead, or even wholly unconscious all those twenty million years, but just slowed, waiting—waiting. You'll dream, too, while that damned thing that Earth wouldn't own is dripping, dripping in the Cosmos House tonight.

"And, Connant," Norris whipped toward the cosmic ray specialist, "won't you have fun sitting up all night in the quiet. Wind whining above—and that thing dripping—!" He stopped for a moment, and looked around.

"I know. That's not science. But this is, it's psychology. You'll have nightmares for a year to come. Every night since I looked at that thing I've had 'em. That's why I hate it—sure I do—and don't want it around. Put it back where it came from and let it freeze for another twenty million years. I had some swell nightmares—that it wasn't made like we are—which is obvious—but of a different kind of flesh that it can really control. That it can change its shape, and look like a man—and wait to kill and eat—"

"That's not a logical argument. I know it isn't. The thing isn't Earth-logic anyway.

"Maybe it has an alien body-chemistry, and maybe its bugs do have a different body-chemistry. A germ might not stand that, but, Blair and Copper, how about a virus? That's just an enzyme molecule, you've said. That wouldn't need anything but a protein molecule of any body to work on.

"And how are you so sure that, of the million varieties of microscopic life it may have, *none* of them are danger-

ous. How about diseases like hydrophobia—rabies—that attacks any warm-blooded creature, whatever its body-chemistry may be? And parrot fever? Have you a body like a parrot, Blair? And plain rot—gangrene—necrosis if you want? *That* isn't choosy about body chemistry!"

BLAIR LOOKED up from his puttering long enough to meet Norris' angry, gray eyes for an instant. "So far the only thing you have said this thing gave off that was catching was dreams. I'll go so far as to admit that." An impish, slightly malignant grin crossed the little man's seamed face. "I had some, too. So. It's dream-infectious. No doubt an exceedingly dangerous malady.

"So far as your other things go, you have a badly mistaken idea about viruses. In the first place, nobody has shown that the enzyme-molecule theory, and that alone, explains them. And in the second place, when you catch tobacco mosaic or wheat rust, let me know. A wheat plant is a lot nearer your body-chemistry than this other-world creature is.

"And your rabies is limited, strictly limited. You can't get it from, nor give it to, a wheat plant or a fish—which is a collateral descendant of a common ancestor of yours. Which this, Norris, is not." Blair nodded pleasantly toward the tarpaulined bulk on the table.

"Well, thaw the damned thing in a tub of formalin if you must thaw it. I've suggested that—"

"And I've said there would be no sense in it. You can't compromise. Why did you and Commander Garry come down here to study magnetism? Why weren't you content to stay at home? There's magnetic force enough in New York. I could no more study the life this thing once had from a formalin-pickled sample than you could get the information you wanted back in New

York. And—if this one is so treated, *never in all time to come can there be a duplicate!* The race it came from must have passed away in the twenty million years it lay frozen, so that even if it came from Mars then, we'd never find its like. And—the ship is gone.

"There's only one way to do this—and that is the best possible way. It must be thawed slowly, carefully, and not in formalin."

Commander Garry stood forward again, and Norris stepped back muttering angrily. "I think Blair is right, gentlemen. What do you say?"

Connant grunted. "It sounds right to us, I think—only perhaps he ought to stand watch over it while it's thawing." He grinned ruefully, brushing a stray lock of ripe-cherry hair back from his forehead. "Swell idea, in fact—if he sits up with his jolly little corpse."

Garry smiled slightly. A general chuckle of agreement rippled over the group. "I should think any ghost it may have had would have starved to death if it hung around here that long, Connant," Garry suggested. "And you look capable of taking care of it. 'Iron-man' Connant ought to be able to take out any opposing players, still."

Connant shook himself uneasily. "I'm not worrying about ghosts. Let's see that thing. I——"

Eagerly Blair was stripping back the ropes. A single throw of the tarpaulin revealed the thing. The ice had melted somewhat in the heat of the room, and it was clear and blue as thick, good glass. It shone wet and sleek under the harsh light of the unshielded globe above.

The room stiffened abruptly. It was face up there on the plain, greasy planks of the table. The broken haft of the bronze ice-ax was still buried in the queer skull. Three mad, hate-filled eyes blazed up with a living fire, bright as fresh-spilled blood, from a face ringed with a writhing, loathsome nest of

worms, blue, mobile worms that crawled where hair should grow——

Van Wall, six feet and 200 pounds of ice-nerved pilot, gave a queer, strangled gasp and butted, stumbled his way out to the corridor. Half the company broke for the doors. The others stumbled away from the table.

McReady stood at one end of the table watching them, his great body planted solid on his powerful legs. Norris from the opposite end glowered at the thing with smouldering hate. Outside the door, Garry was talking with half a dozen of the men at once.

Blair had a tack hammer. The ice that cased the thing *schluffed* crisply under its steel claw as it peeled from the thing it had cased for twenty thousand thousand years——

III.

"I KNOW you don't like the thing, Connant, but it just has to be thawed out right. You say leave it as it is till we get back to civilization. All right, I'll admit your argument that we could do a better and more complete job there



is sound. But—how are we going to get this across the Line? We have to take this through one temperate zone, the equatorial zone, and half way through the other temperate zone before we get it to New York. You don't want to sit with it one night, but you suggest, then, that I hang its corpse in the freezer with the beef?" Blair looked up from his cautious chipping, his bald, freckled skull nodding triumphantly.

Kinner, the stocky, scar-faced cook, saved Connant the trouble of answering. "Hey, you listen, mister. You put that thing in the box with the meat, and by all the gods there ever were, I'll put you in to keep it company. You birds have brought everything movable in this camp in onto my mess tables here already, and I had to stand for that. But you go putting things like that in my meat box, or even my meat cache here, and you cook your own damn grub."

"But, Kinner, this is the only table in Big Magnet that's big enough to work on," Blair objected. "Everybody's explained that."

"Yeah, and everybody's brought everything in here. Clark brings his dogs every time there's a fight and sews them up on that table. Ralsen brings in his sledges. Hell, the only thing you haven't had on that table is the Boeing. And you'd 'a' had that in if you coulda figured a way to get it through the tunnels."

Commander Garry chuckled and grinned at Van Wall, the huge Chief Pilot. Van Wall's great blond beard twitched suspiciously as he nodded gravely to Kinner. "You're right, Kinner. The aviation department is the only one that treats you right."

"It does get crowded, Kinner," Garry acknowledged. "But I'm afraid we all find it that way at times. Not much privacy in an antarctic camp."

"Privacy? What the hell's that? You know, the thing that really made me weep, was when I saw Barclay marchin' through here chantin' 'The last lumber

in the camp! The last lumber in the camp!' and carryin' it out to build that house on his tractor. Damn it, I missed that moon cut in the door he carried out more'n I missed the sun when it set. That wasn't just the last lumber Barclay was walkin' off with. He was carryin' off the last bit of privacy in this blasted place."

A grin rode even on Connant's heavy face as Kinner's perennial, good-natured grouch came up again. But it died away quickly as his dark, deep-set eyes turned again to the red-eyed thing Blair was chipping from its cocoon of ice. A big hand ruffed his shoulder-length hair, and tugged at a twisted lock that fell behind his ear in a familiar gesture. "I know that cosmic ray shack's going to be too crowded if I have to sit up with that thing," he growled. "Why can't you go on chipping the ice away from around it—you can do that without anybody butting in, I assure you—and then hang the thing up over the power-plant boiler? That's warm enough. It'll thaw out a chicken, even a whole side of beef, in a few hours."

"I know," Blair protested, dropping the tack hammer to gesture more effectively with his bony, freckled fingers, his small body tense with eagerness, "but this is too important to take any chances. There never was a find like this; there never can be again. It's the only chance men will ever have, and it has to be done exactly right."

"LOOK, you know how the fish we caught down near the Ross Sea would freeze almost as soon as we got them on deck, and come to life again if we thawed them gently? Low forms of life aren't killed by quick freezing and slow thawing. We have——"

"Hey, for the love of Heaven—you mean that damned thing will come to life!" Connant yelled. "You get the damned thing—— Let me at it! That's going to be in so many pieces——"

"NO! No, you fool——" Blair jumped in front of Connant to protect his precious find. "No. Just *low* forms of life. For Pete's sake let me finish. You can't thaw higher forms of life and have them come to. Wait a moment now—hold it! A fish can come to after freezing because it's so low a form of life that the individual cells of its body can revive, and that alone is enough to reestablish life. Any higher forms thawed out that way are dead. Though the individual cells revive, they die because there must be organization and coöperative effort to live. That coöperation cannot be reestablished. There is a sort of potential life in any uninjured, quick-frozen animal. But it can't—can't under any circumstances—become active life in higher animals. The higher animals are too complex, too delicate. This is an intelligent creature as high in its evolution as we are in ours. Perhaps higher. It is as dead as a frozen man would be."

"How do you know?" demanded Connant, hefting the ice-ax he had seized a moment before.

Commander Garry laid a restraining hand on his heavy shoulder. "Wait a minute, Connant. I want to get this straight. I agree that there is going to be no thawing of this thing if there is the remotest chance of its revival. I quite agree it is much too unpleasant to have alive, but I had no idea there was the remotest possibility."

Dr. Copper pulled his pipe from between his teeth and heaved his stocky, dark body from the bunk he had been sitting in. "Blair's being technical. That's dead. As dead as the mammoths they find frozen in Siberia. Potential life is like atomic energy—there, but nobody can get it out, and it certainly won't release itself except in rare cases, as rare as radium in the chemical analogy. We have all sorts of proof that things don't live after being frozen—not even fish, generally speaking—and

no proof that higher animal life can under any circumstances. What's the point, Blair?"

The little biologist shook himself. The little ruff of hair standing out around his bald pate waved in righteous anger. "The point is," he said in an injured tone, "that the individual cells might show the characteristics they had in life, if it is properly thawed. A man's muscle cells live many hours after he has died. Just because they live, and a few things like hair and fingernail cells still live, you wouldn't accuse a corpse of being a Zombie, or something.

"Now if I thaw this right, I may have a chance to determine what sort of world it's native to. We don't, and can't know by any other means, whether it came from Earth or Mars or Venus or from beyond the stars.

"And just because it looks unlike men, you don't have to accuse it of being evil, or vicious or something. Maybe that expression on its face is its equivalent to a resignation to fate. White is the color of mourning to the Chinese. If men can have different customs, why can't a so-different race have different understandings of facial expressions?"

CONNANT laughed softly, mirthlessly. "Peaceful resignation! If that is the best it could do in the way of resignation, I should exceedingly dislike seeing it when it was looking mad. That face was never designed to express peace. It just didn't have any philosophical thoughts like peace in its make-up.

"I know it's your pet—but be sane about it. That thing grew up on evil, adolesced slowly roasting alive the local equivalent of kittens, and amused itself through maturity on new and ingenious torture."

"You haven't the slightest right to say that," snapped Blair. "How do you know the first thing about the meaning of a facial expression inherently inhuman? It may well have no human

equivalent whatever. That is just a different development of Nature, another example of Nature's wonderful adaptability. Growing on another, perhaps harsher world, it has different form and features. But it is just as much a legitimate child of Nature as you are. You are displaying that childish human weakness of hating the different. On its own world it would probably class you as a fish-belly, white monstrosity with an insufficient number of eyes and a fungoid body pale and bloated with gas.

"Just because its nature is different, you haven't any right to say it's necessarily evil."

Norris burst out a single, explosive, "Haw!" He looked down at the thing. "May be that things from other worlds don't *have* to be evil just because they're different. But that thing *was*! Child of Nature, eh? Well, it was a hell of an evil Nature."

"Aw, will you mugs cut crabbing at each other and get the damned thing off my table?" Kinner growled. "And put a canvas over it. It looks indecent."

"Kinner's gone modest," jeered Connant.

Kinner slanted his eyes up to the big physicist. The scarred cheek twisted to join the line of his tight lips in a twisted grin. "All right, big boy, and what were you grouching about a minute ago? We can set the thing in a chair next to you tonight, if you want."

"I'm not afraid of its face," Connant snapped. "I don't like keeping a wake over its corpse particularly, but I'm going to do it."

Kinner's grin spread. "Uh hu." He went off to the galley stove and shook down ashes vigorously, drowning the brittle chipping of the ice as Blair fell to work again.

IV.

"CLUCK," reported the cosmic ray counter, "*cluck burrrp-cluck.*" Connant started and dropped his pencil.

"Damnation." The physicist looked toward the far corner, back at the Gieger counter on the table near that corner, and crawled under the desk at which he had been working to retrieve the pencil. He sat down at his work again, trying to make his writing more even. It tended to have jerks and quavers in it, in time with the abrupt proud-hen noises of the Gieger counter. The muted whoosh of the pressure lamp he was using for illumination, the mingled gurgles and bugle calls of a dozen men sleeping down the corridor in Paradise House formed the background sounds for the irregular, clucking noises of the counter, the occasional rustle of falling coal in the copper-bellied stove. And a soft, steady *drip-drip-drip* from the thing in the corner.

Connant jerked a pack of cigarettes from his pocket, snapped it so that a cigarette protruded and jabbed the cylinder into his mouth. The lighter failed to function, and he pawed angrily through the pile of papers in search of a match. He scratched the wheel of the lighter several times, dropped it with a curse and got up to pluck a hot coal from the stove with the coal-tongs.

The lighter functioned instantly when he tried it on returning to the desk. The counter ripped out a series of chuckling guffaws as a burst of cosmic rays struck through to it. Connant turned to glower at it, and tried to concentrate on the interpretation of data collected during the past week. The weekly summary —

He gave up and yielded to curiosity, or nervousness. He lifted the pressure lamp from the desk and carried it over to the table in the corner. Then he returned to the stove and picked up the coal tongs. The beast had been thawing for nearly 18 hours now. He poked at it with an unconscious caution; the flesh was no longer hard as armor plate, but had assumed a rubbery texture. It looked like wet, blue rubber

glistening under droplets of water like little round jewels in the glare of the gasoline pressure lantern. Connant felt an unreasoning desire to pour the contents of the lamp's reservoir over the thing in its box and drop the cigarette into it. The three red eyes glared up at him sightlessly, the ruby eyeballs reflecting murky, smoky rays of light.

He realized vaguely that he had been looking at them for a very long time, even vaguely understood that they were no longer sightless. But it did not seem of importance, of no more importance than the labored, slow motion of the tentacular things that sprouted from the base of the scrawny, slowly pulsing neck.

Connant picked up the pressure lamp and returned to his chair. He sat down, staring at the pages of mathematics before him. The clucking of the counter was strangely less disturbing, the rustle of the coals in the stove no longer distracting.

The creak of the floorboards behind him didn't interrupt his thoughts as he went about his weekly report in an automatic manner, filling in columns of data and making brief, summarizing notes.

The creak of the floorboards sounded nearer.

V.

BLAIR came up from the nightmare-haunted depths of sleep abruptly. Connant's face floated vaguely above him; for a moment it seemed a continuance of the wild horror of the dream. But Connant's face was angry, and a little frightened. "Blair—Blair you damned log, wake up."

"Uh—eh?" the little biologist rubbed his eyes, his bony, freckled fingers crooked to a mutilated child-fist. From surrounding bunks other faces lifted to stare down at them.

Connant straightened up. "Get up—and get a lift on. Your damned animal's escaped."

"Escaped—what!" Chief Pilot Van

Wall's bull voice roared out with a volume that shook the walls. Down the communication tunnels other voices yelled suddenly. The dozen inhabitants of Paradise House tumbled in abruptly, Barclay, stocky and bulbous in long woolen underwear, carrying a fire extinguisher.

"What the hell's the matter?" Barclay demanded.

"Your damned beast got loose. I fell asleep about twenty minutes ago, and when I woke up, the thing was gone. Hey, Doc, the hell you say those things can't come to life. Blair's blasted potential life developed a hell of a lot of potential and walked out on us."

Copper stared blankly. "It wasn't—Earthly," he sighed suddenly. "I—I guess Earthly laws don't apply."

"Well, it applied for leave of absence and took it. We've got to find it and capture it somehow." Connant swore bitterly, his deep-set black eyes sullen and angry. "It's a wonder the hellish creature didn't eat me in my sleep."

Blair started back, his pale eyes suddenly fear-struck. "Maybe it di—er—uh—we'll have to find it."

"You find it. It's your pet. I've had all I want to do with it, sitting there for seven hours with the counter clucking every few seconds, and you birds in here singing night-music. It's a wonder I got to sleep. I'm going through to the Ad Building."

Commander Garry ducked through the doorway, pulling his belt tight. "You won't have to. Van's roar sounded like the Boeing taking off down wind. So it wasn't dead?"

"I didn't carry it off in my arms, I assure you," Connant snapped. "The last I saw, that split skull was oozing green goo, like a squashed caterpillar. Doc just said our laws don't work—it's unearthly. Well, it's an unearthly monster, with an unearthly disposition, judging by the face, wandering around with a split skull and brains oozing out."

Norris and McReady appeared in the doorway, a doorway filling with other shivering men. "Has anybody seen it coming over here?" Norris asked innocently. "About four feet tall—three red eyes—brains oozing out— Hey, has anybody checked to make sure this isn't a cracked idea of humor? If it is, I think we'll unite in tying Blair's pet around Connant's neck like the Ancient Mariner's albatross."

"It's no humor," Connant shivered. "Lord, I wish it were. I'd rather wear——" He stopped. A wild, weird howl shrieked through the corridors. The men stiffened abruptly, and half turned.

"I THINK it's been located," Connant finished. His dark eyes shifted with a queer unease. He darted back to his bunk in Paradise House, to return almost immediately with a heavy .45 revolver and an ice-ax. He hefted both gently as he started for the corridor toward Dogtown. "It blundered down the wrong corridor—and landed among the huskies. Listen—the dogs have broken their chains——"

The half-terrorized howl of the dog pack had changed to a wild hunting mêlée. The voices of the dogs thundered in the narrow corridors, and through them came a low rippling snarl of distilled hate. A shrill of pain, a dozen snarling yelps.

Connant broke for the door. Close behind him, McReady, then Barclay and Commander Garry came. Other men broke for the Ad Building, and weapons—the sledge house. Ponroy, in charge of Big Magnet's five cows, started down the corridor in the opposite direction—he had a six-foot-handled, long-tined pitchfork in mind.

Barclay slid to a halt, as McReady's giant bulk turned abruptly away from the tunnel leading to Dogtown, and vanished off at an angle. Uncertainly, the mechanic wavered a moment, the fire

extinguisher in his hands, hesitating from one side to the other. Then he was racing after Connant's broad back. Whatever McReady had in mind, he could be trusted to make it work.

Connant stopped at the bend in the corridor. His breath hissed suddenly through his throat. "Great God——" The revolver exploded thunderously; three numbing, palpable waves of sound crashed through the confined corridors. Two more. The revolver dropped to the hard-packed snow of the trail, and Barclay saw the ice-ax shift into defensive position. Connant's powerful body blocked his vision, but beyond he heard something mewing, and, insanely, chuckling. The dogs were quieter; there was a deadly seriousness in their low snarls. Taloned feet scratched at hard-packed snow, broken chains were clinking and tangling.

Connant shifted abruptly, and Barclay could see what lay beyond. For a second he stood frozen, then his breath went out in a gusty curse. The Thing launched itself at Connant, the powerful arms of the man swung the ice-ax flat-side first at what might have been a head. It scrunched horribly, and the tattered flesh, ripped by a half-dozen savage huskies, leapt to its feet again. The red eyes blazed with an unearthly hatred, an unearthly, unkillable vitality.

Barclay turned the fire extinguisher on it; the blinding, blistering stream of chemical spray confused it, baffled it, together with the savage attacks of the huskies, not for long afraid of anything that did, or could live, held it at bay.

McReady wedged men out of his way and drove down the narrow corridor packed with men unable to reach the scene. There was a sure fore-planned drive to McReady's attack. One of the giant blow-torches used in warming the plane's engines was in his bronzed hands. It roared gustily as he turned the corner and opened the valve. The mad mewing hissed louder. The dogs scrambled

back from the three-foot lance of blue-hot flame.

"Bar, get a power cable, run it in somehow. And a handle. We can electrocute this—monster, if I don't incinerate it." McReady spoke with an authority of planned action. Barclay turned down the long corridor to the power plant, but already before him Norris and Van Wall were racing down.

BARCLAY found the cable in the electrical cache in the tunnel wall. In a half minute he was hacking at it, walking back. Van Wall's voice rang out in warning shout of "Power!" as the emergency gasoline-powered dynamo thudded into action. Half a dozen other men were down there now; the coal, kindling were going into the firebox of the steam power plant. Norris, cursing in a low, deadly monotone, was working with quick, sure fingers on the other end of Barclay's cable, splicing in a connector in one of the power leads.

The dogs had fallen back when Barclay reached the corridor bend, fallen back before a furious monstrosity that glared from baleful red eyes, mewing in trapped hatred. The dogs were a semicircle of red-dipped muzzles with a fringe of glistening white teeth, whining with a vicious eagerness that near matched the fury of the red eyes. McReady stood confidently alert at the corridor bend, the gustily muttering torch held loose and ready for action in his hands. He stepped aside without moving his eyes from the beast as Barclay came up. There was a slight, tight smile on his lean, bronzed face.

Norris' voice called down the corridor, and Barclay stepped forward. The cable was taped to the long handle of a snow-shovel, the two conductors split, and held 18 inches apart by a scrap of lumber lashed at right angles across the far end of the handle. Bare copper conductors, charged with 220 volts, glinted in the light of pressure lamps. The

Things mewed and hated and dodged. McReady advanced to Barclay's side. The dogs beyond sensed the plan with the almost-telepathic intelligence of trained huskies. Their whining grew shriller, softer, their mincing steps carried them nearer. Abruptly a huge, night-black Alaskan leapt onto the trapped thing. It turned squalling, saber-clawed feet slashing.

Barclay leapt forward and jabbed. A weird, shrill scream rose and choked out. The smell of burnt flesh in the corridor intensified; greasy smoke curled up. The echoing pound of the gas-electric dynamo down the corridor became a slogging thud.

The red eyes clouded over in a stiffening, jerking travesty of a face. Arm-like, leglike members quivered and jerked. The dogs leapt forward, and Barclay yanked back his shovel-handled weapon. The thing on the snow did not move as gleaming teeth ripped it open.

VI.

GARRY looked about the crowded room. Thirty-two men, some tensed nervously standing against the wall, some uneasily relaxed, some sitting, most perforce standing, as intimate as sardines. Thirty-two, plus the five engaged in sewing up wounded dogs, made thirty-seven, the total personnel.

Garry started speaking. "All right, I guess we're here. Some of you—three or four at most—saw what happened. All of you have seen that thing on the table, and can get a general idea. Anyone hasn't, I'll lift——" His hand strayed to the tarpaulin bulking over the thing on the table. There was an acrid odor of singed flesh seeping out of it. The men stirred restlessly, hasty denials.

"It looks rather as though Charnauk isn't going to lead any more teams," Garry went on. "Blair wants to get at this thing, and make some more detailed examination. We want to know

what happened, and make sure right now that this is permanently, totally dead. Right?"

Connant grinned. "Anybody that doesn't can sit up with it to-night."

"All right then, Blair, what can you say about it? What was it?" Garry turned to the little biologist.

"I wonder if we ever saw its natural form," Blair looked at the covered mass. "It may have been imitating the beings that built that ship—but I don't think it was. I think that was its true form. Those of us who were up near the bend saw the thing in action; the thing on the table is the result. When it got loose, apparently, it started looking around. Antarctica still frozen as it was ages ago when the creature first saw it—and froze. From my observations while it was thawing out, and the bits of tissue I cut and hardened then, I think it was native to a hotter planet than Earth. It couldn't, in its natural form, stand the temperature. There is no life-form on Earth that can live in Antarctica during the winter, but the best compromise is the dog. It found the dogs, and somehow got near enough to Charnauk to get him. The others smelled it—heard it—I don't know—anyway they went wild, and broke chains, and attacked it before it was finished. The thing we found was part Charnauk, queerly only half-dead, part Charnauk half-digested by the jellylike protoplasm of that creature, and part the remains of the thing we originally found, sort of melted down to the basic protoplasm.

"When the dogs attacked it, it turned into the best fighting thing it could think of. Some other-world beast apparently."

"Turned," snapped Garry. "How?"

"Every living thing is made up of jelly—protoplasm and minute, submicroscopic things called nuclei, which control the bulk, the protoplasm. This thing was just a modification of that same world-wide plan of Nature; cells made

up of protoplasm, controlled by infinitely tinier nuclei. You physicists might compare it—an individual cell of any living thing—with an atom; the bulk of the atom, the space-filling part, is made up of the electron orbits, but the character of the thing is determined by the atomic nucleus.

"This isn't wildly beyond what we already know. It's just a modification we haven't seen before. It's as natural, as logical, as any other manifestation of life. It obeys exactly the same laws. The cells are made of protoplasm, their character determined by the nucleus.

"ONLY in this creature, the cell-nuclei can control those cells *at will*. It digested Charnauk, and as it digested, studied every cell of his tissue, and shaped its own cells to imitate them exactly. Parts of it—parts that had time to finish changing—are dog-cells. But they don't have dog-cell nuclei." Blair lifted a fraction of the tarpaulin. A torn dog's leg, with stiff gray fur protruded. "That, for instance, isn't dog at all; it's imitation. Some parts I'm uncertain about; the nucleus was hiding itself, covering up with dog-cell imitation nucleus. In time, not even a microscope would have shown the difference."

"Suppose," asked Norris bitterly, "it had had lots of time?"

"Then it would have been a dog. The other dogs would have accepted it. We would have accepted it. I don't think anything would have distinguished it, not microscope, nor X-ray, nor any other means. This is a member of a supremely intelligent race, a race that has learned the deepest secrets of biology, and turned them to its use."

"What was it planning to do?" Barclay looked at the humped tarpaulin.

Blair grinned unpleasantly. The wavering halo of thin hair round his bald pate wavered in a stir of air. "Take over the world, I imagine."

"Take over the world! Just it, all by

itself?" Connant gasped. "Set itself up as a lone dictator?"

"No," Blair shook his head. The scalpel he had been fumbling in his bony fingers dropped; he bent to pick it up, so that his face was hidden as he spoke. "It would become the population of the world."

"Become—populate the world? Does it reproduce asexually?"

Blair shook his hand and gulped. "It's—it doesn't have to. It weighed 85 pounds. Charnauk weighed about 90. It would have become Charnauk, and had 85 pounds left, to become—oh, Jack for instance, or Chinook. It can imitate anything—that is, become anything. If it had reached the Antarctic Sea, it would have become a seal, maybe two seals. They might have attacked a killer whale, and become either killers, or a herd of seals. Or maybe it would have caught an albatross, or a skua gull, and flown to South America."

Norris cursed softly. "And every time it digested something, and imitated it——"

"It would have had its original bulk left, to start again," Blair finished. "Nothing would kill it. It has no natural enemies, because it becomes whatever it wants to. If a killer whale attacked it, it would become a killer whale. If it was an albatross, and an eagle attacked it, it would become an eagle. Lord, it might become a female eagle. Go back—build a nest and lay eggs!"

"Are you sure that thing from hell is dead?" Dr. Copper asked softly.

"Yes, thank Heaven," the little biologist gasped. "After they drove the dogs off, I stood there poking Bar's electrocution thing into it for five minutes. It's dead and—cooked."

"Then we can only give thanks that this is Antarctica, where there is not one, single, solitary, living thing for it to imitate, except these animals in camp."

"Us," Blair giggled. "It can imitate us. Dogs can't make 400 miles to the

sea; there's no food. There aren't any skua gulls to imitate at this season. There aren't any penguins this far inland. There's nothing that can reach the sea from this point—except us. We've got brains. We can do it. Don't you see—it's got to imitate us—it's got to be one of us—that's the only way it can fly an airplane—fly a plane for two hours, and rule—be—all Earth's inhabitants. A world for the taking—if it imitates us!

"It didn't know yet. It hadn't had a chance to learn. It was rushed—hurried—took the thing nearest its own size. Look—I'm Pandora! I opened the box! And the only hope that can come out is—that nothing can come out. You didn't see me. I did it. I fixed it. I smashed every magneto. Not a plane can fly. Nothing can fly." Blair giggled and lay down on the floor crying.

CHIEF PILOT Van Wall made a dive for the door. His feet were fading echoes in the corridors as Dr. Copper bent unhurriedly over the little man on the floor. From his office at the end of the room he brought something, and injected a solution into Blair's arm. "He might come out of it when he wakes up," he sighed rising. McReady helped him lift the biologist onto a near-by bunk. "It all depends on whether we can convince him that thing is dead."

Van Wall ducked into the shack brushing his heavy blond beard absently. "I didn't think a biologist would do a thing like that up thoroughly. He missed the spares in the second cache. It's all right. I smashed them."

Commander Garry nodded. "I was wondering about the radio."

Dr. Copper snorted. "You don't think it can leak out on a radio wave do you? You'd have five rescue attempts in the next three months if you stop the broadcasts. The thing to do is talk loud and not make a sound. Now I wonder——"

McReady looked speculatively at the

doctor. "It might be like an infectious disease. Everything that drank any of its blood——"

Copper shook his head. "Blair missed something. Imitate it may, but it has, to a certain extent, its own body chemistry, its own metabolism. If it didn't, it would become a dog—and be a dog and nothing more. It has to be an imitation dog. Therefore you can detect it by serum tests. And its chemistry, since it comes from another world, must be so wholly, radically different that a few cells, such as gained by drops of blood, would be treated as disease germs by the dog, or human body."

"Blood—would one of those imitations bleed?" Norris demanded.

"Surely. Nothing mystic about blood. Muscle is about 90% water; blood differs only in having a couple per cent more water, and less connective tissue. They'd bleed all right," Copper assured him.

Blair sat up in his bunk suddenly. "Connant—where's Connant?"

The physicist moved over toward the little biologist. "Here I am. What do you want?"

"Are you?" giggled Blair. He lapsed back into the bunk contorted with silent laughter.

Connant looked at him blankly. "Huh? Am I what?"

"Are you there?" Blair burst into gales of laughter. "Are you Connant? The beast wanted to be a *man*—not a dog——"

VII.

DR. COPPER rose wearily from the bunk, and washed the hypodermic carefully. The little tinkles it made seemed loud in the packed room, now that Blair's gurgling laughter had finally quieted. Copper looked toward Garry and shook his head slowly. "Hopeless, I'm afraid. I don't think we can ever convince him the thing is dead now."

Norris laughed uncertainly. "I'm not

sure you can convince me. Oh, damn you, McReady."

"McReady?" Commander Garry turned to look from Norris to McReady curiously.

"The nightmares," Norris explained. "He had a theory about the nightmares we had at the Secondary Station after finding that thing."

"And that was?" Garry looked at McReady levelly.

Norris answered for him, jerkily, uneasily. "That the creature wasn't dead, had a sort of enormously slowed existence, an existence that permitted it, none the less, to be vaguely aware of the passing of time, of our coming, after endless years. I had a dream it could imitate things."

"Well," Copper grunted, "it can."

"Don't be an ass," Norris snapped. "That's not what's bothering me. In the dream it could read minds, read thoughts and ideas and mannerisms."

"What's so bad about that? It seems to be worrying you more than the thought of the joy we're going to have with a mad man in an Antarctic camp." Copper nodded toward Blair's sleeping form.

McReady shook his great head slowly. "You know that Connant is Connant, because he not merely looks like Connant—which we're beginning to believe that beast might be able to do—but he thinks like Connant, talks like Connant, moves himself around as Connant does. That takes more than merely a body that looks like him; that takes Connant's own mind, and thoughts and mannerisms. Therefore, though you know that the thing might make itself *look* like Connant, you aren't much bothered, because you know it has a mind from another world, a totally unhuman mind, that couldn't possibly react and think and talk like a man we know, and do it so well as to fool us for a moment. The idea of the creature imitating one of us is fascinating, but unreal because it is

too completely unhuman to deceive us. It doesn't have a human mind."

"As I said before," Norris repeated, looking steadily at McReady, "you can say the damndest things at the damndest times. Will you be so good as to finish that thought—one way or the other?"

Kinner, the scar-faced expedition cook, had been standing near Connant. Suddenly he moved down the length of the crowded room toward his familiar galley. He shook the ashes from the galley stove noisily.

"It would do it no good," said Dr. Copper, softly as though thinking out loud, "to merely look like something it was trying to imitate; it would have to understand its feelings, its reactions. It is unhuman; it has powers of imitation beyond any conception of man. A good actor, by training himself, can imitate another man, another man's mannerisms, well enough to fool most people. Of course no actor could imitate so perfectly as to deceive men who had been living with the imitated one in the complete lack of privacy of an antarctic camp. That would take a super-human skill."

"Oh, you've got the bug too?" Norris cursed softly.

CONNANT, standing alone at one end of the room, looked about him wildly, his face white. A gentle eddying of the men had crowded them slowly down toward the other end of the room, so that he stood quite alone. "My God, will you two Jeremiahs shut up?" Connant's voice shook. "What am I? Some kind of a microscopic specimen you're dissecting? Some unpleasant worm you're discussing in the third person?"

McReady looked up at him; his slowly twisting hands stopped for a moment. "Having a lovely time. Wish you were here. Signed: Everybody.

"Connant, if you think you're having a hell of a time, just move over on the other end for a while. You've got one thing we haven't; you know what the

answer is. I'll tell you this, right now you're the most feared and respected man in Big Magnet."

"Lord, I wish you could see your eyes," Connant gasped. "Stop staring, will you! What the hell are you going to do?"

"Have you any suggestions, Dr. Copper?" Commander Garry asked steadily. "The present situation is impossible."

"Oh, is it?" Connant snapped. "Come over here and look at that crowd. By Heaven, they look exactly like that gang of huskies around the corridor bend. Benning, will you stop hefting that damned ice-ax?"

The coppery blade rang on the floor as the aviation mechanic nervously dropped it. He bent over and picked it up instantly, hefting it slowly, turning it in his hands, his brown eyes moving jerkily about the room.

Copper sat down on the bunk beside Blair. The wood creaked noisily in the room. Far down a corridor, a dog yelped in pain, and the dog-drivers' tense voices floated softly back. "Microscopic examination," said the doctor thoughtfully, "would be useless, as Blair pointed out. Considerable time has passed. However, serum tests would be definitive."

"Serum tests? What do you mean exactly?" Commander Garry asked.

"If I had a rabbit that had been injected with human blood—a poison to rabbits, of course, as is the blood of any animal save that of another rabbit—and the injections continued in increasing doses for some time, the rabbit would be human-immune. If a small quantity of its blood were drawn off, allowed to separate in a test-tube, and to the clear serum, a bit of human blood were added, there would be a visible reaction, proving the blood was human. If cow, or dog blood were added—or any protein material other than that one thing, human blood—no reaction would take place. That would prove definitely."

"Can you suggest where I might catch a rabbit for you, Doc?" Norris asked. "That is, nearer than Australia; we don't want to waste time going that far."

"I know there aren't any rabbits in Antarctica," Copper nodded, "but that is simply the usual animal. Any animal except man will do. A dog for instance. But it will take several days, and due to the greater size of the animal, considerable blood. Two of us will have to contribute."

"Would I do?" Garry asked.

"That will make two," Copper nodded. "I'll get to work on it right away."

"What about Connant in the meantime," Kiener demanded. "I'm going out that door and head off for the Ross Sea before I cook for him."

"He may be human——" Copper started.

Connant burst out in a flood of curses. "Human! May be human, you damned saw-bones! What in hell do you think I am?"

"A monster," Copper snapped sharply. "Now shut up and listen." Connant's face drained of color and he sat down heavily as the indictment was put in words. "Until we know—you know as well as we do that we have reason to question the fact, and only you know how that question is to be answered—we may reasonably be expected to lock you up. If you are—unhuman—you're a lot more dangerous than poor Blair there, and I'm going to see that he's locked up thoroughly. I expect that his next stage will be a violent desire to kill you, all the dogs, and probably all of us. When he wakes, he will be convinced we're all unhuman, and nothing on the planet will ever change his conviction. It would be kinder to let him die, but we can't do that, of course. He's going in one shack, and you can stay in Cosmos House with your cosmic ray apparatus. Which is about what you'd do anyway. I've got to fix up a couple of dogs."

Connant nodded bitterly. "I'm human. Hurry that test. Your eyes—Lord, I wish you could see your eyes staring——"

COMMANDER Garry watched anxiously as Clark, the dog-handler, held the big brown Alaskan husky, while Copper began the injection treatment. The dog was not anxious to coöperate; the needle was painful, and already he'd experienced considerable needle work that morning. Five stitches held closed a slash that ran from his shoulder across the ribs half way down his body. One long fang was broken off short; the missing part was to be found half-buried in the shoulder bone of the monstrous thing on the table in the Ad Building.

"How long will that take?" Garry asked, pressing his arm gently. It was sore from the prick of the needle Dr. Copper had used to withdraw blood.

Copper shrugged. "I don't know, to be frank. I know the general method, I've used it on rabbits. But I haven't experimented with dogs. They're big, clumsy animals to work with; naturally rabbits are preferable, and serve ordinarily. In civilized places you can buy a stock of human-immune rabbits from suppliers, and not many investigators take the trouble to prepare their own."

"What do they want with them back there?" Clark asked.

"Criminology is one large field. A says he didn't murder B, but that the blood on his shirt came from killing a chicken. The State makes a test, then it's up to A to explain how it is the blood reacts on human-immune rabbits, but not on chicken-immunes."

"What are we going to do with Blair in the meantime?" Garry asked wearily. "It's all right to let him sleep where he is for a while, but when he wakes up——"

"Barclay and Benning are fitting some bolts on the door of Cosmos House," Copper replied grimly. "Connant's act-

ing like a gentleman. I think perhaps the way the other men look at him makes him rather want privacy. Lord knows, heretofore we've all of us individually prayed for a little privacy."

Clark laughed brittlely. "Not any more, thank you. The more the merrier."

"Blair," Copper went on, "will also have to have privacy—and locks. He's going to have a pretty definite plan in mind when he wakes up. Ever hear the old story of how to stop hoof-and-mouth disease in cattle?"

Clark and Garry shook their heads silently.

"If there isn't any hoof-and-mouth disease, there won't be any hoof-and-mouth disease," Copper explained. "You get rid of it by killing every animal that exhibits it, and every animal that's been near the diseased animal. Blair's a biologist, and knows that story. He's afraid of this thing we loosed. The answer is probably pretty clear in his mind now. Kill everybody and everything in this camp before a skua gull or a wandering albatross coming in with the spring chances out this way and—catches the disease."

Clark's lips curled in a twisted grin. "Sounds logical to me. If things get too bad—maybe we'd better let Blair get loose. It would save us committing suicide. We might also make something of a vow that if things get bad, we see that that does happen."

COPPER laughed softly. "The last man alive in Big Magnet—wouldn't be a man," he pointed out. "Somebody's got to kill those—creatures that don't desire to kill themselves, you know. We don't have enough thermite to do it all at once, and the decanite explosive wouldn't help much. I have an idea that even small pieces of one of those beings would be self-sufficient."

"If," said Garry thoughtfully, "they can modify their protoplasm at will,

won't they simply modify themselves to birds and fly away? They can read all about birds, and imitate their structure without even meeting them. Or imitate, perhaps, birds of their home planet."

Copper shook his head, and helped Clark to free the dog. "Man studied birds for centuries, trying to learn how to make a machine to fly like them. He never did do the trick; his final success came when he broke away entirely and tried new methods. Knowing the general idea, and knowing the detailed structure of wing and bone and nerve-tissue is something far, far different. And as for other-world birds, perhaps, in fact very probably, the atmospheric conditions here are so vastly different that their birds couldn't fly. Perhaps, even, the being came from a planet like Mars with such a thin atmosphere that there were no birds."

Barclay came into the building, trailing a length of airplane control cable. "It's finished, Doc. Cosmos House can't be opened from the inside. Now where do we put Blair?"

Copper looked toward Garry. "There wasn't any biology building. I don't know where we can isolate him."

"How about East Cache?" Garry said after a moment's thought. "Will Blair be able to look after himself—or need attention?"

"He'll be capable enough. We'll be the ones to watch out," Copper assured him grimly. "Take a stove, a couple of bags of coal, necessary supplies and a few tools to fix it up. Nobody's been out there since last fall, have they?"

Garry shook his head. "If he gets noisy—I thought that might be a good idea."

Barclay hefted the tools he was carrying and looked up at Garry. "If the muttering he's doing now is any sign, he's going to sing away the night hours. And we won't like his song."

"What's he saying?" Copper asked.

Barclay shook his head. "I didn't care to listen much. You can if you want to. But I gathered that the blasted idiot had all the dreams McReady had, and a few more. He slept beside the thing when we stopped on the trail coming in from Secondary Magnetic, remember. He dreamt the thing was alive, and dreamt more details. And—damn his soul—knew it wasn't all dream, or had reason to. He knew it had telepathic powers that were stirring vaguely, and that it could not only read minds, but project thoughts. They weren't dreams, you see. They were stray thoughts that thing was broadcasting, the way Blair's broadcasting his thoughts now—a sort of telepathic muttering in its sleep. That's why he knew so much about its powers. I guess you and I, Doc, weren't so sensitive—if you want to believe in telepathy."

"I have to," Copper sighed. "Dr. Rhine of Duke University has shown that it exists, shown that some are much more sensitive than others."

"Well, if you want to learn a lot of details, go listen in on Blair's broadcast. He's driven most of the boys out of the Ad Building; Kinner's rattling pans like coal going down a chute. When he can't rattle a pan, he shakes ashes."

"By the way, Commander, what are we going to do this spring, now the planes are out of it?"

Garry sighed. "I'm afraid our expedition is going to be a loss. We cannot divide our strength now."

"It won't be a loss—if we continue to live, and come out of this," Copper promised him. "The find we've made, if we can get it under control, is important enough. The cosmic ray data, magnetic work, and atmospheric work won't be greatly hindered."

GARRY laughed mirthlessly. "I was just thinking of the radio broadcasts. Telling half the world about the wonderful results of our exploration flights,

trying to fool men like Byrd and Ellsworth back home there that we're doing something."

Copper nodded gravely. "They'll know something's wrong. But men like that have judgment enough to know we wouldn't do tricks without some sort of reason, and will wait for our return to judge us. I think it comes to this: men who know enough to recognize our deception will wait for our return. Men who haven't discretion and faith enough to wait will not have the experience to detect any fraud. We know enough of the conditions here to put through a good bluff."

"Just so they don't send 'rescue' expeditions," Garry prayed. "When—if—we're ever ready to come out, we'll have to send word to Captain Forsythe to bring a stock of magnetos with him when he comes down. But—never mind that."

"You mean if we don't come out?" asked Barclay. "I was wondering if a nice running account of an eruption or an earthquake via radio—with a swell windup by using a stick of decanite under the microphone—would help. Nothing, of course, will entirely keep people out. One of those swell, melodramatic 'last-man-alive-scenes' might make 'em go easy though."

Garry smiled with genuine humor. "Is everybody in camp trying to figure that out too?"

Copper laughed. "What do you think, Garry? We're confident we can win out. But not too easy about it, I guess."

Clark grinned up from the dog he was petting into calmness. "Confident, did you say, Doc?"

VIII.

BLAIR MOVED restlessly around the small shack. His eyes jerked and quivered in vague, fleeting glances at the four men with him; Barclay, six feet tall and weighing over 190 pounds; McReady, a bronze giant of a man; Dr.

Copper, short, squatly powerful; and Benning, five-feet-ten of wiry strength.

Blair was huddled up against the far wall of the East Cache cabin, his gear piled in the middle of the floor beside the heating stove, forming an island between him and the four men. His bony hands clenched and fluttered, terrified. His pale eyes wavered uneasily as his bald, freckled head darted about in bird-like motion.

"I don't want anybody coming here. I'll cook my own food," he snapped nervously. "Kinner may be human now, but I don't believe it. I'm going to get out of here, but I'm not going to eat any food you send me. I want cans. Sealed cans."

"O. K., Blair, we'll bring 'em tonight," Barclay promised. "You've got coal, and the fire's started. I'll make a last —" Barclay started forward.

Blair instantly scurried to the farthest corner. "Get out! Keep away from me, you monster!" the little biologist shrieked, and tried to claw his way through the wall of the shack. "Keep away from me—keep away—I won't be absorbed—I won't be——"

Barclay relaxed and moved back. Dr. Copper shook his head. "Leave him alone, Bar. It's easier for him to fix the thing himself. We'll have to fix the door, I think——"

The four men let themselves out. Efficiently, Benning and Barclay fell to work. There were no locks in Antarctica; there wasn't enough privacy to make them needed. But powerful screws had been driven in each side of the door frame, and the spare aviation control cable, immensely strong, woven steel wire, was rapidly caught between them and drawn taut. Barclay went to work with a drill and a key-hole saw. Presently he had a trap cut in the door through which goods could be passed without unlashings the entrance. Three powerful hinges from a stock-crate, two hasps and a pair of three-inch cotter-

pins made it proof against opening from the other side.

Blair moved about restlessly inside. He was dragging something over to the door with panting gasps and muttering, frantic curses. Barclay opened the hatch and glanced in, Dr. Copper peering over his shoulder. Blair had moved the heavy bunk against the door. It could not be opened without his coöperation now.

"Don't know but what the poor man's right at that," McReady sighed. "If he gets loose, it is his avowed intention to kill each and all of us as quickly as possible, which is something we don't agree with. But we've something on our side of that door that is worse than a homicidal maniac. If one or the other has to get loose, I think I'll come up and undo those lashings here."

Barclay grinned. "You let me know, and I'll show you how to get these off fast. Let's go back."

The sun was painting the northern horizon in multi-colored rainbows still, though it was two hours below the horizon. The field of drift swept off to the north, sparkling under its flaming colors in a million reflected glories. Low mounds of rounded white on the northern horizon showed the Magnet Range was barely awash above the sweeping drift. Little eddies of wind-lifted snow swirled away from their skis as they set out toward the main encampment two miles away. The spidery finger of the broadcast radiator lifted a gaunt black needle against the white of the Antarctic continent. The snow under their skis was like fine sand, hard and gritty.

"SPRING," said Benning bitterly, "is came. Ain't we got fun! And I've been looking forward to getting away from this blasted hole in the ice."

"I wouldn't try it now, if I were you." Barclay grunted. "Guys that set out from here in the next few days are going to be marvelously unpopular."

"How is your dog getting along, Dr. Copper?" McReady asked. "Any results yet?"

"In 30 hours? I wish there were. I gave him an injection of my blood today. But I imagine another five days will be needed. I don't know certainly enough to stop sooner."

"I've been wondering—if Connant were—changed, would he have warned us so soon after the animal escaped? Wouldn't he have waited long enough for it to have a real chance to fix itself? Until we woke up naturally?" McReady asked slowly.

"The thing is selfish. You didn't think it looked as though it were possessed of a store of the higher justices, did you?" Dr. Copper pointed out. "Every part of it is all of it, every part of it is all for itself, I imagine. If Connant were changed, to save his skin, he'd have to—but Connant's feelings aren't changed; they're imitated perfectly, or they're his own. Naturally, the imitation, imitating perfectly Connant's feelings, would do exactly what Connant would do."

"Say, couldn't Norris or Vane give Connant some kind of a test? If the thing is brighter than men, it might know more physics than Connant should, and they'd catch it out," Barclay suggested.

Copper shook his head wearily. "Not if it reads minds. You can't plan a trap for it. Vane suggested that last night. He hoped it would answer some of the questions of physics he'd like to know answers to."

"This expedition-of-four idea is going to make life happy." Benning looked at his companions. "Each of us with an eye on the others to make sure he doesn't do something—peculiar. Man, aren't we going to be a trusting bunch! Each man eyeing his neighbors with the grandest exhibition of faith and trust—I'm beginning to know what Connant meant by 'I wish you could see your eyes'.

Every now and then we all have it, I guess. One of you looks around with a sort of 'I-wonder-if-the-other-three-are-look.' Incidentally, I'm not excepting myself."

"So far as we know, the animal is dead, with a slight question as to Connant. No other is suspected," McReady stated slowly. "The 'always-four' order is merely a precautionary measure."

"I'm waiting for Garry to make it four-in-a-bunk," Barclay sighed. "I thought I didn't have any privacy before, but since that order——"

NONE WATCHED more tensely than Connant. A little sterile glass test-tube, half-filled with straw-colored fluid. One—two—three—four—five drops of the clear solution Dr. Copper had prepared from the drops of blood from Connant's arm. The tube was shaken



carefully, then set in a beaker of clear, warm water. The thermometer read blood heat, a little thermostat clicked

noisily, and the electric hotplate began to glow as the lights flickered slightly.

Then—little white flecks of precipitation were forming, snowing down in the clear straw-colored fluid. "Lord," said Connant. He dropped heavily into a bunk, crying like a baby. "Six days—" Connant sobbed, "six days in there—wondering if that damned test would lie——"

Garry moved over silently, and slipped his arm across the physicist's back.

"It couldn't lie," Dr. Copper said. "The dog was human-immune—and the serum reacted."

"He's—all right?" Norris gasped. "Then—the animal is dead—dead forever?"

"He is human," Copper spoke definitely, "and the animal is dead."

Kinner burst out laughing, laughing hysterically. McReady turned toward him and slapped his face with a methodical one-two, one-two action. The cook laughed, gulped, cried a moment, and sat up rubbing his cheeks, mumbling his thanks vaguely. "I was scared. Lord, I was scared——"

Norris laughed brittlely. "You think we weren't, you ape? You think maybe Connant wasn't?"

The Ad Building stirred with a sudden rejuvenation. Voices laughed, the men clustering around Connant spoke with unnecessarily loud voices, jittery, nervous voices relievedly friendly again. Somebody called out a suggestion, and a dozen started for their skis. Blair, Blair might recover—— Dr. Copper fussed with his test-tubes in nervous relief, trying solutions. The party of relief for Blair's shack started out the door, skis clapping noisily. Down the corridor, the dogs set up a quick yelping howl as the air of excited relief reached them.

Dr. Copper fussed with his tubes. McReady noticed him first, sitting on the edge of the bunk, with two precipitin-whitened test-tubes of straw-colored

fluid, his face whiter than the stuff in the tubes, silent tears slipping down from horror-widened eyes.

McReady felt a cold knife of fear pierce through his heart and freeze in his breast. Dr. Copper looked up. "Garry," he called hoarsely. "Garry, for God's sake, come here."

Commander Garry walked toward him sharply. Silence clapped down on the Ad Building. Connant looked up, rose stiffly from his seat.

"Garry—tissue from the monster—precipitates too. It proves nothing. Nothing but—but the dog was monster-immune too. That *one of the two contributing blood—one of us two*, you and I, Garry—*one of us is a monster.*"

IX.

"BAR, CALL back those men before they tell Blair," McReady said quietly. Barclay went to the door; faintly his shouts came back to the tensely silent men in the room. Then he was back.

"They're coming," he said. "I didn't tell them why. Just that Dr. Copper said not to go."

"McReady," Garry sighed, "you're in command now. May God help you. I cannot."

The bronzed giant nodded slowly, his deep eyes on Commander Garry.

"I may be the one," Garry added. "I know I'm not, but I cannot prove it to you in any way. Dr. Copper's test has broken down. The fact that he showed it was useless, when it was to the advantage of the monster to have that uselessness not known, would seem to prove he was human."

Copper rocked back and forth slowly on the bunk. "I know I'm human. I can't prove it either. One of us two is a liar, for that test cannot lie, and it says one of us is. I gave proof that the test was wrong, which seems to prove I'm human, and now Garry has given that argument which proves me human—

which he, as the monster, should not do. Round and round and round and round and——"

Dr. Copper's head, then his neck and shoulders began circling slowly in time to the words. Suddenly he was lying back on the bunk, roaring with laughter. "It doesn't have to prove *one* of us is a monster! It doesn't have to prove that at all! Ho-ho. If we're *all* monsters it works the same! We're all monsters—all of us—Connant and Garry and I—and all of you."

"McReady," Van Wall, the blond-bearded Chief Pilot, called softly, "you were on the way to an M. D. when you took up meteorology, weren't you? Can you make some kind of test?"

McReady went over to Copper slowly, took the hypodermic from his hand, and washed it carefully in 95% alcohol. Garry sat on the bunk-edge with wooden face, watching Copper and McReady expressionlessly. "What Copper said is possible," McReady sighed. "Van, will you help here? Thanks." The filled needle jabbed into Copper's thigh. The man's laughter did not stop, but slowly faded into sobs, then sound sleep as the morphia took hold.

McReady turned again. The men who had started for Blair stood at the far end of the room, skis dripping snow, their faces as white as their skis. Connant had a lighted cigarette in each hand; one he was puffing absently, and staring at the floor. The heat of the one in his left hand attracted him and he stared at it, and the one in the other hand stupidly for a moment. He dropped one and crushed it under his heel slowly.

"Dr. Copper," McReady repeated, "could be right. I know I'm human—but of course can't prove it. I'll repeat the test for my own information. Any of you others who wish to may do the same."

Two minutes later, McReady held a test-tube with white precipitin settling slowly from straw-colored serum. "It

reacts to human blood too, so they aren't both monsters."

"I didn't think they were," Van Wall sighed. "That wouldn't suit the monster either; we could have destroyed them if we knew. Why hasn't the monster destroyed us, do you suppose? It seems to be loose."

McReady snorted. Then laughed softly. "Elementary, my dear Watson. The monster wants to have life forms available. It cannot animate a dead body, apparently. It is just waiting—waiting until the best opportunities come. We who remain human, it is holding in reserve."

Kinner shuddered violently. "Hey. Hey, Mac. Mac, would I know if I was a monster? Would I know if the monster had already got me? Oh Lord, I may be a monster already."

"You'd know," McReady answered.

"But we wouldn't," Norris laughed shortly, half-hysterically.

McReady looked at the vial of serum remaining. "There's one thing this damned stuff is good for, at that," he said thoughtfully. "Clark, will you and Van help me? The rest of the gang better stick together here. Keep an eye on each other," he said bitterly. "See that you don't get into mischief, shall we say?"

McReady started down the tunnel toward Dog Town, with Clark and Van Wall behind him. "You need more serum?" Clark asked.

McReady shook his head. "Tests. There's four cows and a bull, and nearly seventy dogs down there. This stuff reacts only to human blood and—monsters."

McREADY came back to the Ad Building and went silently to the wash stand. Clark and Van Wall joined him a moment later. Clark's lips had developed a tic, jerking into sudden, unexpected sneers.

"What did you do?" Connant ex-

ploded suddenly. "More immunizing?"

Clark snickered, and stopped with a hiccough. "Immunizing. Haw! Immune all right."

"That monster," said Van Wall steadily, "is quite logical. Our immune dog was quite all right, and we drew a little more serum for the tests. But we won't make any more."

"Can't—can't you use one man's blood on another dog—" Norris began.

"There aren't," said McReady softly, "any more dogs. Nor cattle, I might add."

"No more dogs?" Benning sat down slowly.

"They're very nasty when they start changing," Van Wall said precisely, "but slow. That electrocution iron you made up, Barclay, is very fast. There is only one dog left—our immune. The monster left that for us, so we could play with our little test. The rest—" He shrugged and dried his hands.

"The cattle—" gulped Kinner.

"Also. Reacted very nicely. They look funny as hell when they start melting. The beast hasn't any quick escape, when it's tied in dog chains, or halters, and it had to be to imitate."

Kinner stood up slowly. His eyes darted around the room, and came to rest horribly quivering on a tin bucket in the galley. Slowly, step by step, he retreated toward the door, his mouth opening and closing silently, like a fish out of water.

"The milk—" he gasped. "I milked 'em an hour ago—" His voice broke into a scream as he dived through the door. He was out on the ice cap without windproof or heavy clothing.

Van Wall looked after him for a moment thoughtfully. "He's probably hopelessly mad," he said at length, "but he might be a monster escaping. He hasn't skis. Take a blow-torch—in case."

The physical motion of the chase helped them; something that needed do-

ing. Three of the other men were quietly being sick. Norris was lying flat on his back, his face greenish, looking steadily at the bottom of the bunk above him.

"Mac, how long have the—cows been not-cows—"

McReady shrugged his shoulders hopelessly. He went over to the milk bucket, and with his little tube of serum went to work on it. The milk clouded it, making certainty difficult. Finally he dropped the test-tube in the stand and shook his head. "It tests negatively. Which means either they were cows then, or that, being perfect imitations, they gave perfectly good milk."

Copper stirred restlessly in his sleep and gave a gurgling cross between a snore and a laugh. Silent eyes fastened on him. "Would morphia—a monster—" somebody started to ask.

"Lord knows," McReady shrugged. "It affects every Earthly animal I know of."

Connant suddenly raised his head. "Mac! The dogs must have swallowed pieces of the monster, and the pieces destroyed them! The dogs were where the monster resided. I was locked up. Doesn't that prove—"

Van Wall shook his head. "Sorry. Proves nothing about what you are, only proves what you didn't do."

"It doesn't do that," McReady sighed. "We are helpless because we don't know enough, and so jittery we don't think straight. Locked up! Ever watch a white corpuscle of the blood go through the wall of a blood vessel? No? It sticks out a pseudopod. And there it is—on the far side of the wall."

"Oh," said Van Wall unhappily. "The cattle tried to melt down, didn't they? They could have melted down—become just a thread of stuff and leaked under a door to re-collect on the other side. Ropes—no—no, that wouldn't do it. They couldn't live in a sealed tank or—"

"If," said McReady, "you shoot it through the heart, and it doesn't die, it's a monster. That's the best test I can think of, offhand."

"No dogs," said Garry quietly, "and no cattle. It has to imitate men now. And locking up doesn't do any good. Your test might work, Mac, but I'm afraid it would be hard on the men."

X.

CLARK LOOKED up from the galley stove as Van Wall, Barclay, McReady and Benning came in, brushing the drift from their clothes. The other men jammed into the Ad Building continued studiously to do as they were doing, playing chess, poker, reading. Ralsen was fixing a sledge on the table; Vane and Norris had their heads together over magnetic data, while Harvey read tables in a low voice.

Dr. Copper snored softly on the bunk. Garry was working with Dutton over a sheaf of radio messages on the corner of Dutton's bunk and a small fraction of the radio table. Connant was using most of the table for Cosmic Ray sheets.

Quite plainly through the corridor, despite two closed doors, they could hear Kinner's voice. Clark banged a kettle onto the galley stove and beckoned McReady silently. The meteorologist went over to him.

"I don't mind the cooking so damn much," Clark said nervously, "but isn't there some way to stop that bird? We all agreed that it would be safe to move him into Cosmos House."

"Kinner?" McReady nodded toward the door. "I'm afraid not. I can dope him, I suppose, but we don't have an unlimited supply of morphia, and he's not in danger of losing his mind. Just hysterical."

"Well, we're in danger of losing ours. You've been out for an hour and a half. That's been going on steadily ever since,

and it was going for two hours before. There's a limit, you know."

Garry wandered over slowly, apologetically. For an instant, McReady caught the feral spark of fear—horror—in Clark's eyes, and knew at the same instant it was in his own. Garry—Garry or Copper—was certainly a monster.

"If you could stop that, I think it would be a sound policy, Mac," Garry spoke quietly. "There are—tensions enough in this room. We agreed that it would be safe for Kinner in there, because every one else in camp is under constant eyeing." Garry shivered slightly. "And try, try in God's name, to find some test that will work."

McReady sighed. "Watched or unwatched, everyone's tense. Blair's jammed the trap so it won't open now. Says he's got food enough, and keeps screaming 'Go away, go away—you're monsters. I won't be absorbed. I won't. I'll tell men when they come. Go away.' So—we went away."

"There's no other test?" Garry pleaded.

McReady shrugged his shoulders. "Copper was perfectly right. The serum test could be absolutely definitive if it hadn't been—contaminated. But that's the only dog left, and he's fixed now."

"Chemicals? Chemical tests?"

McReady shook his head. "Our chemistry isn't that good. I tried the microscope you know."

Garry nodded. "Monster-dog and real dog were identical. But—you've got to go on. What are we going to do after dinner?"

VAN WALL had joined them quietly. "Rotation sleeping. Half the crowd sleep; half awake. I wonder how many of us are monsters? All the dogs were. We thought we were safe, but somehow it got Copper—or you." Van Wall's eyes flashed uneasily. "It may have gotten every one of you—all of you but myself may be wondering, look-

ing. No, that's not possible. You'd just spring then. I'd be helpless. We humans must somehow have the greater numbers now. But——" he stopped.

McReady laughed shortly. "You're doing what Norris complained of in me. Leaving it hanging. 'But if one more is changed—that may shift the balance of power.' It doesn't fight. I don't think it ever fights. It must be a peaceable thing, in its own—inimitable—way. It never had to, because it always gained its end—otherwise."

Van Wall's mouth twisted in a sickly grin. "You're suggesting then, that perhaps it already *has* the greater numbers, but is just waiting—waiting, all of them—all of you, for all I know—waiting till I, the last human, drop my wariness in sleep. Mac, did you notice their eyes, all looking at us?"

Garry sighed. "You haven't been sitting here for four straight hours, while all their eyes silently weighed the information that one of us two, Copper or I, is a monster certainly—perhaps both of us."

Clark repeated his request. "Will you stop that bird's noise? He's driving me nuts. Make him tone down, anyway."

"Still praying?" McReady asked.

"Still praying," Clark groaned. "He hasn't stopped for a second. I don't mind his praying if it relieves him, but he yells, he sings psalms and hymns and shouts prayers. He thinks God can't hear well way down here."

"Maybe he can't," Barclay grunted. "Or he'd have done something about this thing loosed from hell."

"Somebody's going to try that test you mentioned, if you don't stop him," Clark stated grimly. "I think a cleaver in the head would be as positive a test as a bullet in the heart."

"Go ahead with the food. I'll see what I can do. There may be something in the cabinets." McReady moved wearily toward the corner Copper had used as his dispensary. Three tall cabinets of

rough boards, two locked, were the repositories of the camp's medical supplies. Twelve years ago McReady had graduated, had started for an internship, and been diverted to meteorology. Copper was a picked man, a man who knew his profession thoroughly and modernly. More than half the drugs available were totally unfamiliar to McReady; many of the others he had forgotten. There was no huge medical library here, no series of journals available to learn the things he had forgotten, the elementary, simple things to Copper, things that did not merit inclusion in the small library he had been forced to content himself with. Books are heavy, and every ounce of supplies had been freighted in by air.

McReady picked a barbiturate hopefully. Barclay and Van Wall went with him. One man never went anywhere alone in Big Magnet.

Ralsen had his sledge put away, and the physicists had moved off the table, the poker game broken up when they got back. Clark was putting out the food. The click of spoons and the muffled sounds of eating were the only sign of life in the room. There were no words spoken as the three returned; simply all eyes focused on them questioningly, while the jaws moved methodically.

McReady stiffened suddenly. Kinner was screeching out a hymn in a hoarse, cracked voice. He looked wearily at Van Wall with a twisted grin and shook his head. "Hu-uh."

VAN WALL cursed bitterly, and sat down at the table. "We'll just plumb have to take that till his voice wears out. He can't yell like that forever."

"He's got a brass throat and a cast-iron larynx," Norris declared savagely. "Then we could be hopeful, and suggest he's one of our friends. In that case he could go on renewing his throat till doomsday."

Silence clamped down. For twenty minutes they ate without a word. Then Connant jumped up with an angry violence. "You sit as still as a bunch of graven images. You don't say a word, but oh, Lord, what expressive eyes you've got. They roll around like a bunch of glass marbles spilling down a table. They wink and blink and stare—and whisper things. Can you guys look somewhere else for a change, please?"

"Listen, Mac, you're in charge here. Let's run movies for the rest of the night. We've been saying those reels to make 'em last. Last for what? Who is it's going to see those last reels, eh? Let's see 'em while we can, and look at something other than each other."

"Sound idea, Connant. I, for one, am quite willing to change this in any way I can."

"Turn the sound up loud, Dutton. Maybe you can drown out the hymns," Clark suggested.

"But don't," Norris said softly, "don't turn off the lights altogether."

"The lights will be out," McReady shook his head. "We'll show all the cartoon movies we have. You won't mind seeing the old cartoons will you?"

"Goody, goody—a moon pitcher show. I'm just in the mood," McReady turned to look at the speaker, a lean, lanky New Englander, by the name of Caldwell. Caldwell was stuffing his pipe slowly, a sour eye cocked up to McReady.

The bronze giant was forced to laugh. "O. K., Bart, you win. Maybe we aren't quite in the mood for Popeye and trick ducks, but it's something."

"Let's play Classifications," Caldwell suggested slowly. "Or maybe you call it Guggenheim. You draw lines on a piece of paper, and put down classes of things—like animals, you know. One for 'H' and one for 'U' and so on. Like 'Human' and 'unknown' for instance. I think that would be a hell of a lot better game. Classification, I sort of fig-

ure, is what we need right now a lot more than movies. Maybe somebody's got a pencil that he can draw lines with, draw lines between the 'U' animals and the 'H' animals for instance."

"McReady's trying to find that kind of a pencil," Van Wall answered quietly, "but we've got three kinds of animals here, you know. One that begins with 'M'. We don't want any more."

"Mad ones, you mean. Uh-hu. Clark, I'll help you with those pots so we can get our little peep-show going." Caldwell got up slowly.

DUTTON and Barclay and Benning, in charge of the projector and sound mechanism arrangements, went about their job silently, while the Ad Building was cleared and the dishes and pans disposed of. McReady drifted over toward Van Wall slowly, and leaned back in the bunk beside him. "I've been wondering, Van," he said with a wry grin, "whether or not to report my ideas in advance. I forgot the 'U animals' as Caldwell named it, could read minds. I've a vague idea of something that might work. It's too vague to bother with though. Go ahead with your show, while I try to figure out the logic of the thing. I'll take this bunk."

Van Wall glanced up, and nodded. The movie screen would be practically on a line with this bunk, hence making the pictures least distracting here, because least intelligible. "Perhaps you should tell us what you have in mind. As it is, only the unknowns know what you plan. You might be—unknown before you got it into operation."

"Won't take long, if I get it figured out right. But I don't want any more all-but-the-test-dog-monsters things. We better move Copper into this bunk directly above me. He won't be watching the screen either." McReady nodded toward Copper's gently snoring bulk. Garry helped them lift and move the doctor.

McReady leaned back against the bunk, and sank into a trance, almost, of concentration, trying to calculate chances, operations, methods. He was scarcely aware as the others distributed themselves silently, and the screen lit up. Vaguely Kinner's hectic, shouted prayers and his rasping hymn-singing annoyed him till the sound accompaniment started. The lights were turned out, but the large, light-colored areas of the screen reflected enough light for ready visibility. It made men's eyes sparkle as they moved restlessly. Kinner was still praying, shouting, his voice a raucous accompaniment to the mechanical sound. Dutton stepped up the amplification.

So long had the voice been going on, that only vaguely at first was McReady aware that something seemed missing. Lying as he was, just across the narrow room from the corridor leading to Cosmos House, Kinner's voice had reached him fairly clearly, despite the sound accompaniment of the pictures. It struck him abruptly that it had stopped.

"Dutton, cut that sound," McReady called as he sat up abruptly. The pictures flickered a moment, soundless and strangely futile in the sudden, deep silence. The rising wind on the surface above bubbled melancholy tears of sound down the stove pipes. "Kinner's stopped," McReady said softly.

"For God's sake start that sound then; he may have stopped to listen," Norris snapped.

McReady rose and went down the corridor. Barclay and Van Wall left their places at the far end of the room to follow him. The flickers bulged and twisted on the back of Barclay's gray underwear as he crossed the still-functioning beam of the projector. Dutton snapped on the lights, and the pictures vanished.

Norris stood at the door as McReady had asked. Garry sat down quietly in the bunk nearest the door, forcing Clark

to make room for him. Most of the others had stayed exactly where they were. Only Connant walked slowly up and down the room, in steady, unvarying rhythm.

"If you're going to do that, Connant," Clark spat, "we can get along without you altogether, whether you're human or not. Will you stop that damned rhythm?"

"Sorry." The physicist sat down in a bunk, and watched his toes thoughtfully. It was almost five minutes, five ages while the wind made the only sound, before McReady appeared at the door.

"We," he announced, "haven't got enough grief here already. Somebody's tried to help us out. Kinner has a knife in his throat, which was why he stopped singing, probably. We've got monsters, madmen and murderers. Any more 'M's' you can think of, Caldwell? If there are, we'll probably have 'em before long."

XI.

"IS BLAIR loose?" someone asked.

"Blair is not loose. Or he flew in. If there's any doubt about where our gentle helper came from—this may clear it up." Van Wall held a foot-long, thin-bladed knife in a cloth. The wooden handle was half-burnt, charred with the peculiar pattern of the top of the galley stove.

Clark stared at it. "I did that this afternoon. I forgot the damn thing and left it on the stove."

Van Wall nodded. "I smelled it, if you remember. I knew the knife came from the galley."

"I wonder," said Benning looking around at the party warily, "how many more monsters have we? If somebody could slip out of his place, go back of the screen to the galley and then down to the Cosmos House and back—he did come back didn't he? Yes—everybody's here. Well, if one of the gang could do all that——"

"Maybe a monster did it," Garry suggested quietly. "There's that possibility."

"The monster, as you pointed out today, has only men left to imitate. Would he decrease his—supply, shall we say?" Van Wall pointed out. "No, we just have a plain, ordinary louse, a murderer to deal with. Ordinarily we'd call him an 'inhuman murderer' I suppose, but we have to distinguish now. We have inhuman murderers, and now we have human murderers. Or one at least."

"There's one less human," Norris said softly. "Maybe the monsters have the balance of power now."

"Never mind that," McReady sighed and turned to Barclay. "Bar, will you get your electric gadget? I'm going to make certain——"

Barclay turned down the corridor to get the pronged electrocutor, while McReady and Van Wall went back toward Cosmos House. Barclay followed them in some thirty seconds.

The corridor to Cosmos House twisted, as did nearly all corridors in Big Magnet, and Norris stood at the entrance again. But they heard, rather muffled, McReady's sudden shout. There was a savage flurry of blows, dull *ch-thunk*, *shluff* sounds. "Bar—Bar——" And a curious, savage mewing scream, silenced before even quick-moving Norris had reached the bend.

Kinner—or what had been Kinner—lay on the floor, cut half in two by the great knife McReady had had. The meteorologist stood against the wall, the knife dripping red in his hand. Van Wall was stirring vaguely on the floor, moaning, his hand half-consciously rubbing at his jaw. Barclay, an unutterably savage gleam in his eyes, was methodically leaning on the pronged weapon in his hand, jabbing—jabbing, jabbing.

Kinner's arms had developed a queer, scaly fur, and the flesh had twisted. The fingers had shortened, the hand

rounded, the finger nails become three-inch long things of dull red horn, keened to steel-hard, razor-sharp talons.

McReady raised his head, looked at the knife in his hand and dropped it. "Well, whoever did it can speak up now. He was an inhuman murderer at that—in that he murdered an inhuman. I swear by all that's holy, Kinner was a lifeless corpse on the floor here when we arrived. But when It found we were going to jab it with the power—It changed."

NORRIS stared unsteadily. "Oh, Lord, those things can act. Ye gods—sitting in here for hours, mouthing prayers to a God it hated! Shouting hymns in a cracked voice—hymns about a Church it never knew. Driving us mad with its ceaseless howling——"

"Well. Speak up, whoever did it. You didn't know it, but you did the camp a favor. And I want to know how in blazes you got out of that room without anyone seeing you. It might help in guarding ourselves."

"His screaming—his singing. Even the sound projector couldn't drown it." Clark shivered. "It was a monster."

"Oh," said Van Wall in sudden comprehension. "You *were* sitting right next to the door, weren't you? And almost behind the projection screen already."

Clark nodded dumbly. "He—it's quiet now. It's a dead—Mac, your test's no damn good. It was dead anyway, monster or man, it was dead."

McReady chuckled softly. "Boys, meet Clark, the only one we know is human! Meet Clark, the one who proves he's human by trying to commit murder—and failing. Will the rest of you please refrain from trying to prove you're human for a while? I think we may have another test."

"A test!" Connant snapped joyfully, then his face sagged in disappointment.

"I suppose it's another either-way-you-want-it."

"No," said McReady steadily. "Look sharp and be careful. Come into the Ad Building. Barclay, bring your electrocutor. And somebody—Dutton—stand with Barclay to make sure he does it. Watch every neighbor, for by the Hell these monsters came from, I've got something, and they know it. They're going to get dangerous!"

The group tensed abruptly. An air of crushing menace entered into every man's body, sharply they looked at each other. More keenly than ever before—*is that man next to me an inhuman monster?*

"What is it?" Garry asked, as they stood again in the main room. "How long will it take?"

"I don't know, exactly," said McReady, his voice brittle with angry determination. "But I *know* it will work, and no two ways about it. It depends on a basic quality of the *monsters*, not on us. 'Kinner' just convinced me." He stood heavy and solid in bronzed immobility, completely sure of himself again at last.

"This," said Barclay hefting the wooden-handled weapon, tipped with its two sharp-pointed, charged conductors, "is going to be rather necessary, I take it. Is the power plant assured?"

Dutton nodded sharply. "The automatic stoker bin is full. The gas power plant is on stand-by. Van Wall and I set it for the movie operation and—we've checked it over rather carefully several times, you know. Anything those wires touch, dies," he assured them grimly. "I know that."

Dr. Copper stirred vaguely in his bunk, rubbed his eyes with fumbling hand. He sat up slowly, blinked his eyes blurred with sleep and drugs, widened with an unutterable horror of drug-ridden nightmares. "Garry," he mumbled, "Garry—listen. Selfish—from hell they came, and hellish shellfish—I

mean self—— Do I? What do I mean?" He sank back in his bunk, and snored softly.

McREADY looked at him thoughtfully. "We'll know presently," he nodded slowly. "But selfish is what you mean, all right. You may have thought of that, half-sleeping, dreaming there. I didn't stop to think what dreams you might be having. But that's all right. Selfish is the word. They must be, you see." He turned to the men in the cabin, tense, silent men staring with wolfish eyes each at his neighbor. "Selfish, and as Dr. Copper said—*every part is a whole*. Every piece is self-sufficient, an animal in itself.

"That, and one other thing, tell the story. There's nothing mysterious about blood; it's just as normal a body tissue as a piece of muscle, or a piece of liver. But it hasn't so much connective tissue, though it has millions, billions of life-cells."

McReady's great bronze beard ruffled in a grim smile. "This is satisfying, in a way. I'm pretty sure we humans still outnumber you—others. Others standing here. And we have what you, your other-world race, evidently doesn't. Not an imitated, but a bred-in-the-bone instinct, a driving, unquenchable fire that's genuine. We'll fight, fight with a ferocity you may attempt to imitate, but you'll never equal! We're human. We're real. You're imitations, false to the core of your every cell."

"All right. It's a showdown now. You know. You, with your mind reading. You've lifted the idea from my brain. You can't do a thing about it.

"Standing here——

"Let it pass. Blood is tissue. They have to bleed, if they don't bleed when cut, then by Heaven, they're phony! Phony from hell! If they bleed—then that blood, separated from them, is an individual—a *newly formed individual in its own right, just as they, split, all*

of them, from one original, are individuals!

"Get it, Van? See the answer, Bar?"

Van Wall laughed very softly. "The blood—the blood will not obey. It's a new individual, with all the desire to protect its own life that the original—the main mass from which it was split—has. The *blood* will live—and try to crawl away from a hot needle, say!"

McReady picked up the scalpel from the table. From the cabinet, he took a rack of test-tubes, a tiny alcohol lamp, and a length of platinum wire set in a little glass rod. A smile of grim satisfaction rode his lips. For a moment he glanced up at those around him. Barclay and Dutton moved toward him slowly, the wooden-handled electric instrument alert.

"Dutton," said McReady, "suppose you stand over by the splice there where you've connected that in. Just make sure no—thing pulls it loose."

Dutton moved away. "Now, Van, suppose you be first on this."

White faced, Van Wall stepped forward. With a delicate precision, McReady cut a vein in the base of his thumb. Van Wall winced slightly, then held steady as a half inch of bright blood collected in the tube. McReady put the tube in the rack, gave Van Wall a bit of alum, and indicated the iodine bottle.

Van Wall stood motionlessly watching. McReady heated the platinum wire in the alcohol lamp flame, then dipped it into the tube. It hissed softly. Five times he repeated the test. "Human, I'd say." McReady sighed, and straightened. "As yet, my theory hasn't been actually proven—but I have hopes. I have hopes.

"Don't, by the way, get too interested in this. We have with us some unwellcome ones, no doubt. Van, will you relieve Barclay at the switch? Thanks. O. K., Barclay, and may I say I hope you stay with us? You're a damned good guy."

Barclay grinned uncertainly; winced under the keen edge of the scalpel. Presently, smiling widely, he retrieved his long-handled weapon.

"Mr. Samuel Dutt—Bar!"

THE TENSITY was released in that second. Whatever of hell the monsters may have had within them, the men in that instant matched it. Barclay had no chance to move his weapon as a score of men poured down on the thing that had seemed Dutton. It mewed, and spat, and tried to grow fangs—and was a hundred broken, torn pieces. Without knives, or any weapon save the brute-given strength of a staff of picked men, the thing was crushed, rent.

Slowly they picked themselves up, their eyes smouldering, very quiet in their motions. A curious wrinkling of their lips betrayed a species of nervousness.

Barclay went over with the electric weapon. Things smouldered and stank. The caustic acid Van Wall dropped on each spilled drop of blood gave off tickling, cough-provoking fumes.

McReady grinned, his deep-set eyes alight and dancing. "Maybe," he said softly, "I underrated man's abilities when I said nothing human could have the ferocity in the eyes of that thing we found. I wish we could have the opportunity to treat in a more befitting manner these things. Something with boiling oil, or melted lead in it, or maybe slow roasting in the power boiler. When I think what a man Dutton was—"

"Never mind. My theory is confirmed by—by one who knew? Well, Van Wall and Barclay are proven. I think, then, that I'll try to show you what I already know. That I too, am human." McReady swished the scalpel in absolute alcohol, burned it off the metal blade, and cut the base of his thumb expertly.

Twenty seconds later he looked up from the desk at the waiting men. There were more grins out there now, friendly

grins, yet withal, something else in the eyes.

"Connant," McReady laughed softly, "was right. The huskies watching that thing in the corridor bend had nothing on you. Wonder why we think only the wolf blood has the right to ferocity? Maybe on spontaneous viciousness a wolf takes tops, but after these seven days—abandon all hope, ye wolves who enter here!

"Maybe we can save time. Connant, would you step for——"

Again Barclay was too slow. There were more grins, less tensility still, when Barclay and Van Wall finished their work.

Garry spoke in a low, bitter voice. "Connant was one of the finest men we had here—and five minutes ago I'd have sworn he was a man. Those damnable things are more than imitation." Garry shuddered and sat back in his bunk.

And thirty seconds later, Garry's blood shrank from the hot platinum wire, and struggled to escape the tube, struggled as frantically as a suddenly feral, red-eyed, dissolving imitation of Garry struggled to dodge the snake-tongue weapon Barclay advanced at him, white-faced and sweating. The Thing in the test-tube screamed with a tiny, tinny voice as McReady dropped it into the glowing coal of the galley stove.

XII.

"THE LAST OF IT?" Dr. Copper looked down from his bunk with blood-shot, saddened eyes. "Fourteen of them——"

McReady nodded shortly. "In some ways—if only we could have permanently prevented their spreading—I'd like to have even the imitations back. Commander Garry—Connant—Dutton—Clark——"

"Where are they taking those things?" Copper nodded to the stretcher Barclay and Norris were carrying out.

"Outside. Outside on the ice, where they've got fifteen smashed crates, half a ton of coal, and presently will add 10 gallons of kerosene. We've dumped acid on every spilled drop, every torn fragment. We're going to incinerate those."

"Sounds like a good plan." Copper nodded wearily. "I wonder, you haven't said whether Blair——"

McReady started. "We forgot him! We had so much else! I wonder—do you suppose we can cure him now?"

"If——" began Dr. Copper, and stopped meaningly.

McReady started a second time. "Even a madman. It imitated Kinner and his praying hysteria——" McReady turned toward Van Wall at the long table. "Van, we've got to make an expedition to Blair's shack."

Van looked up sharply, the frown of worry faded for an instant in surprised remembrance. Then he rose, nodded. "Barclay better go along. He applied the lashings, and may figure how to get in without frightening Blair too much."

Three quarters of an hour, through—37° cold, while the Aurora curtain bellied overhead. The twilight was nearly 12 hours long, flaming in the north on snow like white, crystalline sand under their skis. A 5-mile wind piled it in drift-lines pointing off to the northwest. Three quarters of an hour to reach the snow-buried shack. No smoke came from the little shack, and the men hastened.

"Blair!" Barclay roared into the wind when he was still a hundred yards away. "Blair!"

"Shut up," said McReady softly. "And hurry. He may be trying a lone hike. If we have to go after him—no planes, the tractors disabled——"

"Would a monster have the stamina a man has?"

"A broken leg wouldn't stop it for more than a minute," McReady pointed out.

BARCLAY gasped suddenly and pointed aloft. Dim in the twilight sky, a winged thing circled in curves of indescribable grace and ease. Great white wings tipped gently, and the bird swept over them in silent curiosity. "Albatross——" Barclay said softly. "First of the season, and wandering way inland for some reason. If a monster's loose——"

Norris bent down on the ice, and tore hurriedly at his heavy, windproof clothing. He straightened, his coat flapping open, a grim blue-metalled weapon in his hand. It roared a challenge to the white silence of Antarctica.

The thing in the air screamed hoarsely. Its great wings worked frantically as a dozen feathers floated down from its tail. Norris fired again. The bird was moving swiftly now, but in an almost straight line of retreat. It screamed again, more feathers dropped and with beating wings it soared behind a ridge of pressure ice, to vanish.

Norris hurried after the others. "It won't come back," he panted.

Barclay cautioned him to silence, pointing. A curiously, fiercely blue light beat out from the cracks of the shack's door. A very low, soft humming sounded inside, a low, soft humming and a clink and click of tools, the very sounds somehow bearing a message of frantic haste.

McReady's face paled. "Lord help us if that thing has——" He grabbed Barclay's shoulder, and made snipping motions with his fingers, pointing toward the lacing of control-cables that held the door.

Barclay drew the wire-cutters from his pocket, and knelt soundlessly at the door. The snap and twang of cut wires made an unbearable racket in the utter quiet of the Antarctic hush. There was only that strange, sweetly soft hum from within the shack, and the queerly, hectically clipped clicking and rattling of tools to drown their noises.

McReady peered through a crack in the door. His breath sucked in huskily and his great fingers clamped cruelly on Barclay's shoulder. The meteorologist backed down. "It isn't," he explained very softly, "Blair. It's kneeling on something on the bunk—something that keeps lifting. Whatever it's working on is a thing like a knapsack—and it lifts."

"All at once," Barclay said grimly. "No. Norris, hang back, and get that iron of yours out. It may have—weapons."

Together, Barclay's powerful body and McReady's giant strength struck the door. Inside, the bunk jammed against the door screeched madly and crackled into kindling. The door flung down from broken hinges, the patched lumber of the doorpost dropping inward.

Like a blue-rubber ball, a Thing bounced up. One of its four tentaclelike arms looped out like a striking snake. In a seven-tentacled hand a six-inch pencil of winking, shining metal glinted and swung upward to face them. Its line-thin lips twitched back from snake-fangs in a grin of hate, red eyes blazing.

Norris' revolver thundered in the confined space. The hate-washed face twitched in agony, the looping tentacle snatched back. The silvery thing in its hand a smashed ruin of metal, the seven-tentacled hand became a mass of mangled flesh oozing greenish-yellow ichor. The revolver thundered three times more. Dark holes drilled each of the three eyes before Norris hurled the empty weapon against its face.

THE THING screamed in feral hate, a lashing tentacle wiping at blinded eyes. For a moment it crawled on the floor, savage tentacles lashing out, the body twitching. Then it staggered up again, blinded eyes working, boiling hideously, the crushed flesh sloughing away in sodden gobbets.

Barclay lurched to his feet and dove

forward with an ice-ax. The flat of the weighty thing crushed against the side of the head. Again the unkillable monster went down. The tentacles lashed out, and suddenly Barclay fell to his feet in the grip of a living, livid rope. The thing dissolved as he held it, a white-hot band that ate into the flesh of his hands like living fire. Frantically he tore the stuff from him, held his hands where they could not be reached. The blind Thing felt and ripped at the tough, heavy, wind-proof cloth, seeking flesh—flesh it could convert—

The huge blow-torch McReady had brought coughed solemnly. Abruptly it rumbled disapproval throatily. Then it laughed gurglingly, and thrust out a blue-white, three-foot tongue. The Thing on the floor shrieked, flailed out blindly with tentacles that writhed and withered in the bubbling wrath of the blow-torch. It crawled and turned on the floor, it shrieked and hobbled madly, but always McReady held the blow-torch on the face, the dead eyes burning and bubbling uselessly. Frantically the Thing crawled and howled.

A tentacle sprouted a savage talon—and crisped in the flame. Steadily McReady moved with a planned, grim campaign. Helpless, maddened, the Thing retreated from the grunting torch, the caressing, licking tongue. For a moment it rebelled, squalling in inhuman hatred at the touch of the icy snow. Then it fell back before the charring breath of the torch, the stench of its flesh bathing it. Hopelessly it retreated—on and on across the antarctic snow. The bitter wind swept over it, twisting the torch-tongue; vainly it flopped, a trail of oily, stinking smoke bubbling away from it—

McReady walked back toward the shack silently. Barclay met him at the door. "No more?" the giant meteorologist asked grimly.

Barclay shook his head. "No more. It didn't split?"

"It had other things to think about," McReady assured him. "When I left it, it was a glowing coal. What was it doing?"

Norris laughed shortly. "Wise boys, we are. Smash magnetos, so planes won't work. Rip the boiler tubing out of the tractors. And leave that Thing alone for a week in this shack. Alone and undisturbed."

McReady looked in at the shack more carefully. The air, despite the ripped door, was hot and humid. On a table at the far end of the room rested a thing of coiled wires and small magnets, glass tubing and radio tubes. At the center a block of rough stone rested. From the center of the block came the light that flooded the place, the fiercely blue light bluer than the glare of an electric arc, and from it came the sweetly soft hum. Off to one side was another mechanism of crystal glass, blown with an incredible neatness and delicacy, metal plates and a queer, shimmery sphere of insubstantiality.

"What is that?" McReady moved nearer.

NORRIS grunted. "Leave it for investigation. But I can guess pretty well. That's atomic power. That stuff to the left—that's a neat little thing for doing what men have been trying to do with 100-ton cyclotrons and so forth. It separates neutrons from heavy water, which he was getting from the surrounding ice."

"Where did he get all—oh. Of course. A monster couldn't be locked in—or out. He's been through the apparatus caches." McReady stared at the apparatus. "Lord, what minds that race must have—"

"The shimmery sphere—I think it's a sphere of pure force. Neutrons can pass through any matter, and he wanted a supply reservoir of neutrons. Just project neutrons against silica—calcium—

beryllium—almost anything, and the atomic energy is released. That thing is the atomic generator."

McReady plucked a thermometer from his coat. "It's 120° in here, despite the open door. Our clothes have kept the heat out to an extent, but I'm sweating now."

Norris nodded. "The light's cold. I found that. But it gives off heat to warm the place through that coil. He had all the power in the world. He could keep it warm and pleasant, as his race thought of warmth and pleasantness. Did you notice the light, the color of it?"

McReady nodded. "Beyond the stars is the answer. From beyond the stars. From a hotter planet that circled a brighter, bluer sun they came."

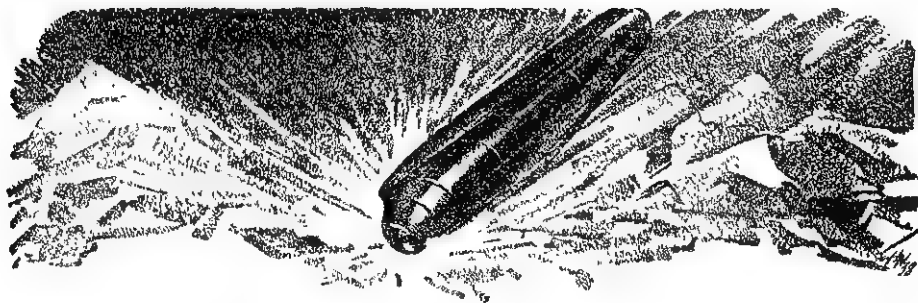
McReady glanced out the door toward

through the ceiling's wood without scorching it. Barclay walked over to it, grasped two of the dangling straps in his hands, and pulled it down with an effort. He strapped it about his body. A slight jump carried him in a weirdly slow arc across the room.

"Anti-gravity," said McReady softly.

"Anti-gravity," Norris nodded. "Yes, we had 'em stopped, with no planes, and no birds. The birds hadn't come—but they had coffee-tins and radio parts, and glass and the machine shop at night. And a week—a whole week—all to itself. America in a single jump—with anti-gravity powered by the atomic energy of matter.

"We had 'em stopped. Another half hour—it was just tightening these straps on the device so it could wear it—and we'd have stayed in Antarctica, and shot



the blasted, smoke-stained trail that flopped and wandered blindly off across the drift. "There won't be any more coming, I guess. Sheer accident it landed here, and that was twenty million years ago. What did it do all that for?" He nodded toward the apparatus.

Barclay laughed softly. "Did you notice what it was working on when we came? Look." He pointed toward the ceiling of the shack.

Like a knapsack made of flattened coffee-tins, with dangling cloth straps and leather belts, the mechanism clung to the ceiling. A tiny, glaring heart of supernal flame burned in it, yet burned

down any moving thing that came from the rest of the world."

"The albatross——" McReady said softly. "Do you suppose——"

"With this thing almost finished? With that death weapon it held in its hand?"

"No, by the grace of God, who evidently does hear very well, even down here, and the margin of half an hour, we keep our world, and the planets of the system too. Anti-gravity, you know, and atomic power. Because *They* came from another sun, a star beyond the stars. *They* came from a world with a bluer sun.



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The Terrible Sense

by
Calvin Peregoy



Not sight nor touch nor hearing—nor any human sense—yet through it he learned the terror and the tyranny of Sound.

AMAZING," said Dr. Botts to himself. He removed the ear cups from Mr. Theodore Clews and hooked the audiometer to the center of his forehead and the base of his skull. He threw on 110 decibels, the equiva-

lent of 100,000,000,000 units of relative sound energy or a well-developed thunder clap.

Mr. Clews had been sitting in the timid concentration of his habitual wormlike psychology of life. Had he

known his otological tests had long since passed the relatively low points equivalent to a pneumatic drill or elevated train running through his ear, he would probably have died of horror.

As it was, he simply vibrated to the thunderous oscillations of 110 decibels. Not even his inner ear responded. He felt a decided and painful tremor in his foot, but it did not occur to him it had anything to do with sound. He shook his head negatively.

Dr. Botts switched off the current and removed the wires. He wrote on a piece of paper, "I am afraid you are deaf." Mentally he noted that some superior term was needed to convey an expression of Mr. Clews' conditions.

Mr. Theodore Clews' cup of woe flowed over. It was not bad enough that nobody had ever called him Ted; that he had been forced to wear long curls to the age of 12; that his mother had still taken all but two dollars of his pay at 25; that fourteen younger, less experienced and less efficient bookkeepers had been advanced over him; and that he was less than dust to his tyrannous wife! Now, suddenly, he was stone deaf. He broke down and wept.

Dr. Botts caught himself ready to make tests of the ultrashort-wave radiations of a mortal afflicted with staggering grief. He reminded himself this was a client and withstrained his curiosity with effort. It was a truly amazing case—the first case of absolute utter deafness the doctor had ever witnessed.

The doctor was not beset by traditional ethics and conscience. With forefinger and thumb he held his lips together a moment. No use thinking of reconstructing Mr. Clews' ordinary hearing apparatus. It was defunct forever.

But something might be done with his nervous system. Something along the order of a bat's aural system. Of course, it would require the correlating

system of a bat's real ear also, but that might be taken from a bat itself.

The doctor examined his fingers with sudden interest. Why not? Why not duplicate in the timid Theodore Clews the entire audio-nervous system of a bat? The doctor restrained a strong morbid impulse to make it a vampire bat. He dropped a small tablet in a glass of cold water and gave it to the distraught Theodore Clews. Then he went to select the most sensitive bat in his sterile menagerie.

A MONTH LATER, Mr. Theodore Clews timidly and thankfully shook hands with Dr. Botts and left his sanatorium. The delicate operation had been a success. Already, he could hear better than ever before. It was a strange type of hearing which had given him moments of uneasy thought during the past few days, but it was hearing.

"It will take several months for the new system to become completely synchronized with your motor nervous system," the doctor announced.

Mr. Clews went timidly back to his five-room flat and the stored-up tyranny of his wife. Except that her loud accusations had become more strident, his life did not seem to have changed. The only ill effect of the operation was that he had become more nervous. The clatter of adding machines in the office began to drive him into frenzy. The scratch of his pen reached such a pitch that he had to change to a snub-nosed stub.

Three months had passed before Mrs. Clews ran out of immediate faults to find with her husband. With tight jaws she was considering a mythical millionaire she might have married—if she had ever known a millionaire—when a tense expression on the face of her husband attracted her attention. His eyes were bright and his gaze was riveted on the cat.

"Well that's a fine one for her that was the daughter of a police captain to have for a husband!" she commented scathingly. "Scared of a cat! Don't say a word, Theodore Clews, it's written on your face as clear as day!"

Mr. Clews jumped and colored. He tried to crouch less conspicuously in a corner of the chair. But inevitably his gaze returned to the cat and he subconsciously moved forward to the edge of his seat. But oddly, he was not looking at the cat when it silently yawned and shifted. Yet Theodore Clews knew what the cat had done as if a photograph had been flashed in his mind.

He heard it! He even heard the cat's toes go back together!

The cat started to lick itself, stopped, its head swinging toward corners of the room. Intently it gazed with its fiery eyes, rolling onto haunches ready to spring. Suddenly it looked at Mr. Clews. A second it glared. Then it hissed, leaped in a somersault and rushed from the room.

For minutes, Mr. Clews' heart thumped like a sledge hammer. That savage glare of the cat had put his heart into his throat. But it occurred to him the cat had been equally as afraid of something about *him*. He could not figure what. Like his wife, the cat had been wont either to disdain him altogether, or else accept him very condescendingly.

The cat's fear slowly filled Mr. Clews with a sense of well being. Nothing before had ever been afraid of him. Now he had impressed his importance as a man—well, at least upon the cat. He went to bed well pleased with life.

He had forgotten to open the window which faced a dark court. The room was cluttered with tables, chairs, trunks and boxes, but he made his way to the window in the dark without touching a thing. Theodore Clews was not very observant or he would have been sur-

prised that he knew where every object was. He could not have explained, but he could have told that the big bureau was precisely seven feet two inches from the very spot where he stepped into bed.

NOISES began to become a very important part of Mr. Clews' life. The noise of adding machines and typewriters had first annoyed him. Now they frightened him, so that he would pause at the bottom of a row of figures and have to grip the desk with sudden trembling. He eyed the quiet, sound-proofed office of the chief bookkeeper, who had been advanced over him, with envy and jealousy. It was the first time he had ever been truly jealous of another man's success.

The riotous noise of rushing crowds at closing time drove Mr. Clews near hysteria. He began staying late, finishing up odds and ends of work he had never paid much attention to. There was a highly difficult piece of accounting to be done which had to be done on outside time. Clews' chief noticed his penchant for working late.

"What do you think about Clews doing it?" he asked the big boss.

The big boss chuckled. "Just the man! He's too scared to even think what's behind figures!"

It was dark when Clews would leave, and to avoid the noise he took to walking home through the less used and darker back streets. It did not occur to him, but he seldom used his eyes to see where he was going. He simply knew when he came to alleys and crossings—where lamp-posts and people were—without looking.

At home, the cat began to grow thin. At night it slunk onto the fire-escape with swift backward glances at Clews. But not all cats were as frightened. A toughy in the dock district had waited and silently stalked him many nights. Each night it crept a little closer behind him for a block.

One night it began to gallop on silent feet. Clews was thinking of that special job he was doing when he suddenly felt alarm and leaped straight up. The cat sailed beneath him with open mouth and unsheathed claws.

Clews started to run without thinking. Suddenly he remembered the fear their own cat had of him. He whirled. Along the dark pavement the cat was galloping in a low crouch. He could not see it clearly, could barely define movement in the shadow. The cat tensed and leaped in attack. At the same second, Clews leaped aside. Without thinking, he reached out and caught the cat by the tail. Before he realized what he had done, he had dashed its brains out.

His act appalled him and made him slightly sick. Then he began to enjoy the sensation of victory. By the time he arrived home he was glad he had killed the cat. When he thought of it again at dinner, he licked his lips a little.

Daily, the noise at the office was becoming more deafening to his system. He began to hate the noise and the people responsible for it. His fear turned to anger. Particularly was it focused on the man who had that quiet, sound-proofed office, his immediate chief.

He did not notice it, but he no longer turned to see who was approaching. He knew long before he was fully conscious of their footsteps or voices. He was sitting on one side of a partition with Will Flanagan at noon one day when Will said idly, "I wonder exactly what Marie Stevens is doing at one minute to twelve?"

"Combing her hair," Theodore said. He was not guessing. She might just as well have been powdering or rouging. But he knew she was combing her hair.

Will looked around the partition and said, "Jeepers!" He gave Clews a peculiar look.

The other bookkeepers began making a lot of remarks like that to Clews. As

long as they asked about somebody in the room, or standing in a draft blowing into the room, Clews usually knew the answer. A week later they framed him. They had Marie Stevens sit absolutely quiet behind a filing case. They led up to the idea and asked Clews.

Clews' mind went blank with concentration. He had not discovered how he knew things yet. He had not even discovered he was being kidded. After a second he said seriously, "She's trying to be quiet. But she's chewing gum."

The committee ran to investigate. She was. They did not notice that the effort of absolute control made her breathe a little harder.

THEY BEGAN to dodge Clews' eyes after that, and to avoid being close to him. But he did not notice their new attitude. He was busy with the special work. Free minutes were filled with increasing rage at the noise around him, and jealousy of the man with that quiet office. Suddenly it occurred to Clews to get that man's job. It was simply an idea intention. He had never tried to get another man's job before.

Summer came on, and Clews donned thin clothing. On hot days when he sat in the office in shirt sleeves, the noise was deafening. When he stretched his arms to cool the perspiration the noise made him shiver.

He was stretching when he suddenly heard his boss talking. It surprised him, for his boss was nowhere in the room. He put his elbows on his desk and the sound ceased. Later he stretched again and again he heard his boss. He stood up, holding his arms out and turning subconsciously. He dropped one arm at an angle. He heard the voice as if it were next to him.

Clews turned white with the discovery, but he listened. It was something about that special job he was doing after hours. The other, lower voice was the big boss. Beads of perspiration

popped out on timid Clews' forehead. That job was the private account of the firm—the account the government did not see. When he sat down to think over this awful discovery, the voices stopped. A mosquito floated through the air. Without thinking, Clews reached out and grabbed it in flight.

His wife was in a particular temper that night. She railed for an hour. Clews thought the racket of her voice would drive him mad. "Well," she finally screeched, "can't you answer?" Her voice hit a highly unpleasant note. It rasped across Clews' nerves like a file.

He looked up at her, his eyes going red with rage. Before he knew what he had done, he had knocked her down. She stood gaping with surprise while he grabbed up his coat and went out.

Clews walked along a dark street deep in thought. He was surprised that he was not more shocked at his own action. Somehow, it had seemed the thing to do. She'd have to stop using those strident notes unless she wanted him to walk out.

The night was filled with a world of sound-pictures. He knew that four people walked out of a house a block distant and turned toward the waterfront. He heard radios, but that was expected. But he knew that somebody on either the third or fourth floor rear of the house across the street turned on their water faucet. He tilted his head to one side. Without thinking, one of his arms and legs lifted and moved slowly about. Suddenly he knew the person using that water was a woman. It had a different sound hitting on masculine flesh and muscle.

When he put his leg down, he knew that a night shift was using picks on the new subway far beneath. He felt the rumble of a truck, and then another similar rumble. But he knew that one truck was running west, three streets north, and that the other one was in the ex-

cavation underfoot. There was a terrible din northward, but out of it he picked the bell of a fire engine. That would be about a mile and a half away, he thought.

HE WAS THIRSTY and passed a little restaurant. Out behind was a quiet summer garden with soft lights. He went out and sat down. The waiter came up and stood behind his line of vision, but he knew the waiter was six feet tall, and knew the length of his arms.

He ordered a lemonade made of fresh-cut lemons. The waiter disappeared and Clews absently stretched a leg and rested his arm over another chair. He did not notice his arm jumping nervously.

The waiter brought a lemonade and Clews said, "That's not fresh lemons. I want lemons cut and squeezed special."

The waiter said, "That's what I gave you, sir."

Clews looked at him and said, "You had this squeezed in a pitcher in the icebox. You put the ice in the glass before you poured the lemon juice."

The waiter swallowed, gawked, blanched and took the lemonade back. Clews was momentarily frightened at what he had said. How did he know that? The kitchen was back in the house. But he *knew it!* He got over his fright and began to feel proud of his knowledge. Why should he be scared? He could scare other people!

A man and a woman came in and sat at a distant table. Clews knew the man was his big boss without looking. The woman laughed, and Clews felt pretty certain she was not the boss' wife. He readjusted his position without thinking and heard the murmured conversation distinctly. No, it was not the wife.

After a few drinks the woman laughed more and louder. There was an irritating quality to her voice and

Clews moved to the inside bar without looking at them. He sat with his feet on the upper rung of the high stool and his arms doubled closely against the sides of his chest. It was better this way. He did not hear that grating laugh.

The woman passed behind him and he heard his boss come up. The boss laughed and ordered drinks.

"Didn't realize you were a drinking man, Clews! Well, a long one doesn't do any harm in this heat, eh?"

Clews ordered another lemonade. He didn't like the sound of the boss' voice. It held an unconvincing tone of smoothness. It annoyed him and it made him think of the office and that private job for which he wasn't paid a dime extra.

The boss took half his drink and said, "By the way, this little meeting will just be between us two?" There was a threat in the tone. It made Clews angry.

Clews said, "I should have had Dice's job. I was senior and I know more about the work."

The boss colored. "That's rather high-handed, Clews!"

"So are those private books," Clews said. He looked at the boss for the first time. When he raised his arm to drink he knew that the boss was scared. Clews could hear his heart pounding.

"We'll see what we can do tomorrow," the boss said.

The next week Clews was put in charge of his department. He got the sound-proofed room. He breathed with relief. He wasn't frightened and angered by noise all the time in there! And—the work of the department picked up immediately. The clerks kept their eyes on Clews when he came through, and a few of them said silent prayers. It was uncanny that he could tell them at the end of the day that they had been reading a book or writing a letter instead of working on figures when he had been clean across the room!

THERE WAS a lot that was uncanny about Clews lately, they whispered. For one thing, he didn't pay any attention to where he was going, yet he never hit anything. Then there was the way he acted. Sometimes when he was listening his arm or leg would go out and vibrate like a throbbing pipe. And he heard every word they said no matter how quietly they whispered!

When fall came, Clews grew more nervous than ever. The streets were full of traffic noise during the daytime. It actually pained him at times. And he was developing a fondness for night roaming which left him tired and groggy the next day. He was nervous, too, at his increasing knowledge of an unpleasant kind. A laugh, a word, a swift motion, and he would size people up. How, he had no idea. But he would know they were shallow, scheming, disloyal, dishonest.

It was startling the number of people who weren't what they seemed. Down at the office they all smiled pleasantly at him, but they hated him. They were frightened of him. He knew that from the noise their motions made as he passed by them. Sometimes he would have his foot out in the hall and hear what they were whispering about him.

He was shocked by the crookedness of the firm he worked for, too. He did not yet have the courage of his convictions or he would have reported them. He had learned too much—more than he wanted to know. As on the day he had his hand on the wall of the president's office and heard the conversation with a prominent politician inside. Or the day he laid his finger tips on a telephone cord and heard what was being said over the wire.

He didn't want to know those things! They upset him, made him mad at himself and disgusted with life! He was losing the few friends he had ever had, also. Part of this was his fault. Some of them had given him time just out of

pity, or because they were in the same boat, or out of amusement. He knew why they had put up with him now. He knew it from the fine differences of tone they used with him.

But there was something more than that. He frightened them lately. His motions were strangely nervous and quick, and sometimes he answered remarks they had thought, but had not stated. He would say, "Here comes John," when John was still half a block away and around the corner.

And occasionally he dropped things which showed he knew a lot of what they had said behind his back or in the privacy of their homes. Such as the day he consoled Mary Bevins, who lived three floors lower down in a different house, because her husband had left her. It hadn't been a loud quarrel and Mary was telling people that he was just away on a business trip.

The only satisfaction in life was that he had tamed his wife. It had taken some outbursts of rage and fists which he was thoroughly ashamed of when he thought about it. But it had had a surprising effect. She had become docile, loving, quiet, soft-spoken. In fact she had become a new woman. Where she had been wont to yell with a piercing voice, she now sang softly. It had affected her temperament. She was happy. She told her cronies about what a capable and self-reliant man *Mr. Clews* was.

The first cold of winter struck bitterly into Theodore's bones. It hurt him, and he felt very sleepy. He would go to sleep the minute he got home. In the morning he would find himself doubled up with his knees beneath his chin and his hands firmly clenching the footboard of the bed.

Frightened, he went to see Dr. Botts. He did more analyzing about matters lately because so many new and inexplicable events took place in his life. He had figured out that his sleepiness might have something to do with his

audio operation. The city noise had assaulted his nerves, and perhaps he was run down.

Dr. Botts was away for a year in the jungles!

BLEAKLY, Clews faced the fact. There was nobody who could do anything for him. Nobody else could even find anything wrong or different with him! For the first time in his life, he sat down and seriously analyzed himself and his private life. For the first time he realized how his character, as well as his body and nerves, had changed since the operation.

Now he was sleepy, so terribly sleepy that he could barely pull through the day. He felt he would simply have to take a month off. He went to see his president.

There was a conference inside the office. Clews sat down wearily against the wall and spread his arms. Instantly, he heard every word said inside. The president was trying to put through a deal, and whoever he was talking to wanted a higher price.

Suddenly Clews paid closer heed. There was something about the man's voice—— He began to make mental notes of his reactions. When the man passed out, the deal was supposedly all set.

Clews walked in and said, "That man was lying. He isn't going to sign the order. I think he's a spy from another company."

The president scoffed and scowled.

Clews said he wanted a month vacation.

The president thought of Clews' confidential knowledge of the company books and said, "Well, we'll see."

Clews left knowing the president was trying to find some way to get rid of him. He was too sleepy to think much about it. He was almost asleep when the president burst in that afternoon with a white face.

"That man this morning was from Clinton & Co., our sharpest rivals! They've got our inside price and a good guess at production costs!"

Clews shrugged wearily. "He sounded crooked," he said simply.

The president looked at Clews strangely. He said, "Clews, you do look sick. I think a winter in the south is what you need. I'm giving you enough to go south for six months."

But Clews didn't go south. He went home and went to bed. In a half-wakeful state he kept trying to get further under the covers. His wife went out, and while she was gone he crawled over to the closet and crawled inside, moving in a sleep-walking trance.

SLOWLY, a feeling of cramped inactivity came to him. Sluggish life seemed returning to long-stiffened arms and legs. His eyes blinked open, and shut hastily. A low, purring hum of outer sounds welled up, and through it the soft, low twittering of birds. Somewhere a breeze ruffled leaves. Clews shook himself slightly, uneasily, and opened his eyes again.

The surroundings dazed his slow-awakening mind. Something, vaguely, was wrong with his room. Something dark and brown draped peculiarly in front of him. Sensation messages from the nerves of arms and legs began to convey meaning. His legs were hooked over the coat-rail in his closet, and he was hanging head-down, quite comfortably, but extremely hungry. He belched softly and swung stiffly to the floor.

His wife was coming, he knew suddenly, and he relaxed gently on the floor, seated with arms queerly angled. His wife entered, and looked at him with no surprise, but a vague satisfaction. "Hungry?"

He nodded slowly. His neck was stiff. "Very."

"You were last week." She went out again. Slowly her words penetrated to

his wakening mind. He turned gingerly and looked out the window. His arm lifted and moved about. The twittering of birds grew stronger. A pair of blue-birds were struggling with a tangle of string in the crotch of the old maple tree. He could scarcely see them because of the leaves.

"It's—spring," said Mr. Clews numbly, when his wife returned with a deep cup of broth.

"May," she nodded. Her voice was calm, but her eyes were frightened. "You—you hibernated. I—I went to the doctor, but he was gone—the one that operated on you—and his assistant came. He said to let you alone. You woke up a little a week ago."

Mr. Clews drank the soup, and hiccuped gently. His head nodded forward and he crawled toward the bed. "I'll be all right," he said, with a peculiar certainty of knowledge. He crawled into the bed, and went to sleep.

Six hours later he woke up again, and ate some more. In a week he was moving around, the queer stiffness going from his limbs. He felt fine.

CLEWS made his first trips out late at night. He took careful stock of himself now. He had changed even more during the winter. His motions were three times as quick, and often he would stop and wheel, almost dancing, at some strange noise.

A cop standing quietly in a doorway suddenly said, "Well, well, butterfly, come along and we'll find a nice cocoon for you!"

Clews darted away in terror and horrible realization of his motions.

He kept to even later hours and less frequented districts along the waterfront after that. He tried to avoid people. But he got in the center of a brightly lighted block one night when groups came out of bars at both corners and stood lounging on the curb. He had to pass one. He checked his motions as

much as possible, but his steps were light and dainty, and he had the feeling that he *fluttered* down the block. Any distant or near-by sound and involuntarily his quivering arms and legs would leap out or his head cock to one side.

A tough drunk at the corner watched his progress. He stepped out and began badgering. Clews' undeniable instinct was to run. But something in the tough's voice turned his fear to anger. A psychiatrist might have told him the root of anger is fear. He told the tough to shut up.

"Well, for cripes' sake, listen at the prissy telling me to shut up!" roared the tough. He stepped nearer and made a sudden feint and pass. It whistled over Clews' head.

CLEWS HAD never had a fight in his life. The mere thought terrified him. For ten minutes he avoided annihilation simply because he heard the fighter's motion and dodged. He had no conscious thought of dodging; it was sheer timed nervous reaction. He was utterly frightened.

Then the roars of the tough began to goad him. A particular stream of curses had a high-pitched note which made him see red. He began fighting back, savagely, with no idea of how to fight, but jumping in and out like a—*bat!* They pulled him off the tough when his teeth were sinking into the man's throat.

"Wait a minute, wait a minute, wild-cat!" a dapper member of the party said. "Man, if you're going to kill 'em, make the public pay to see it! Come in and have a drink and cool off."

Clews went in because he was taken. He sat down shaking like a leaf. It appeared he had just butchered the lightweight champ!

"You don't look like much," the dapper man said, "but I've never seen such beautiful weaving and timing in my life! Why, fellow, you'll make a fortune! You don't even need to hit 'em. They'll

go down from missing you!"

Before Clews could understand quite how it had happened, he was on his way to becoming lightweight champion. The nervous, fluttering, perfect timing of his motions packed the arenas. Never had a man behaved like that in the ring before! But it was the goods—nobody touched him in twelve fights! By then, he was learning about fighting, and when he got against tougher opponents he could lean and take their punches. But they seldom landed. Clews was too fast in his jittery, pulsing, nervous maneuvers. No matter what tricks they pulled, he seemed to sense them, the direction of their punches, the timing and power in them, and be somewhere else when they arrived.

Then his own knockout began, for his timing was perfect, and once he learned to hit, it did not take much power to stretch his opponent on the canvas. Inevitably, these knockouts were correlated with the size and yelling of the crowd. They would come in the same round with a certain tempo and note and decibel measurement of the crowd's roar. The fierceness with which Clews hit them was something uncontrollable, absolutely not part of his conscious self. It was direct reflex of that roar on the nerves of his body.

Nobody ever knew the torture, the sheer physical pain, those roars caused him. He struck out in nervous frenzy. The night the crowd increased its roar after he knocked out the champ, he K. O'd the referee and three men in the ring before they grabbed him.

But Clews was not happy. Loyally, his wife accompanied him in public, but at home he caught her sobbing at times, and when she looked at him or he hugged her closely, there was terror in her eyes.

"I don't know what's come over you, Ted," she said once—she called him "Ted" now—"it gives me the creeps. It isn't just you hanging like that all

winter. The doctor said that was just nerves had drawn your bones and muscles up or something. But it's——"

"What?" asked Clews nervously.

"I—I don't know how to say it. I don't even know myself. It's just like you were something different, like an animal or something. I was up at the zoo the other day and I felt just the same." She stopped and broke out crying miserably.

"When you looked at the—the bats?" Clews asked with a dry voice.

She nodded unhappily.

CLEWS went into strange foreign parts that night. He did not know exactly what the doctor had done to him, but he did know it was tied up with a bat's ultra-sensitive auditory system.

Three battle-scarred cats sitting on a stoop hissed and arched their backs at him. He turned, and with screams of terror they rushed away. He looked down at his arm and saw it was oscillating rapidly in a peculiar, half-turned position. His fingers were open and moved without any volition of his.

He shivered, and drew his arms tightly to his sides. He knew exactly how far the cats had gone! Two of them had gone to the back of a house; one had raced along the street and turned east.

Theodore Clews felt very unhappy. He was rich, and popular with crowds, and his "eccentricities" were now called "form" and studied. But he was losing his wife. And, oddly, he was in love with this woman who had upbraided him for so many years. Botts or no Botts, he had to know how far this bat business had gone!

His manager looked at him with popping eyes. The cigar in his mouth went out for the first time in history. "You're nuts!" he informed Clews.

Clews smiled without humor. "Maybe. But I want to try it. I'm giving up the title in any event."

"Holy Moses, he wants a title match and *he's going to fight blindfolded!* Tape over his eyes!" the manager yelled. "Listen, Clews, you're a sensation. You're a genius. You got something nobody ever heard of before! But you got to see a man's fists if you're not going to get hit by 'em!"

"That's what I want to find out," Clews said.

He won his argument because he had been a careful bookkeeper and he had as carefully read the contract he signed with his manager. They had to do what he said.

Ziggy Nelson, his manager, was quite tight the night of the fight. He wiped perspiration from a beefy forehead and planked down fifty thousand dollars at 50 to 1 odds. The commission agent said, around his cigar, "I thought it was your *fighter* was cracked! There's going to be a special judge to see that tape is O. K."

"I know it!" Ziggy said from his boots. "But I don't want my fighter to be crazy all alone. Who else is betting on him?"

"Nobody," the agent said and looked guilty. "Except me," he added in a whisper.

Theodore Clews, the Battling Bat, sat on his rubbing table nervously. About fourteen thousand people were out in the arena. He could judge from the noise. He shook his head when they held out tape for his hands. He was going to need them free as possible.

His wife kidded him for the benefit of the press. He heard her soft intake of breath before she went through the ritual and knew she was ready to scream with that unaccountable fear. He thought of her kissing one of those bats in the zoo. A woman really had to love you to stand you changing to a bat!

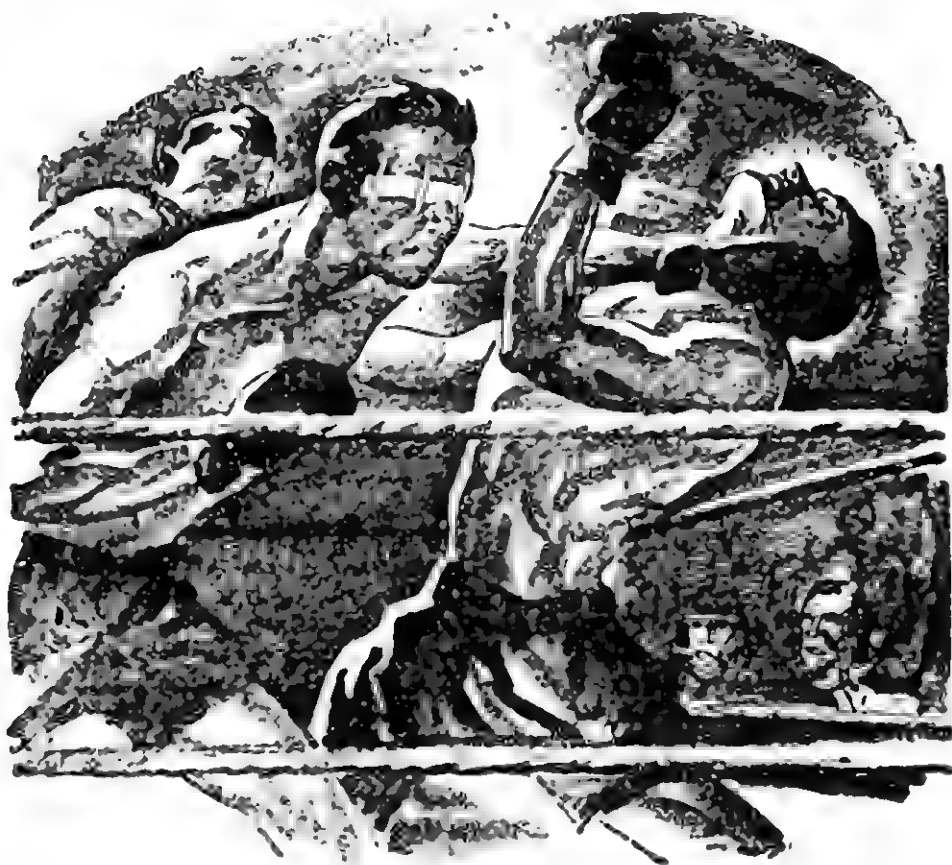
Well—tonight would prove it. He went out and climbed into the ring. They put tape over his eyes and in-

spected it to see that it really shut out all sight. One of the judges climbed out of the ring, Clews knew.

THE GONG rang and he jumped out straight for his opponent. The man was grinning—which Clews did not know—

which sense it was—most of what the man did. At the end of the third he was still on his feet and had taken no killing punches. But his ears were ringing, buzzing—and he was conscious of them.

In the fourth, that hysteria that set



He could not see—it wasn't feeling—nor hearing, quite—but somehow he knew where his opponent's gloves were moving!

but he did know when he put his left foot forward and began a haymaker up-percut. He felt it coming and ducked. It missed him by the fraction of an inch. The crowd roared.

Clews was not quite certain. He got pretty badly battered up—much worse than ever before. But he could hear, or feel—he was tired of trying to decide

him wild came into the crowd's roar. Clews heard his opponent's breathing and the sound of his shuffling feet. The man was puzzled and he was scared. His timing was off. He was going to pieces.

The roar crescendoed, the savage yell for a knockout. Clews had never been so terrified in his life. A bat caught in

a giant spider web might feel that way! He almost ran from the ring. Then came that maddening tempo and piercing note. Clews mind went red. He lashed out in a series of short jabs.

He did not even know that they connected, but he knew exactly where the man's jaw and arms and body were. What was the answer? How did he know? The roar went higher. He hit again and crossed to the solar plexus.

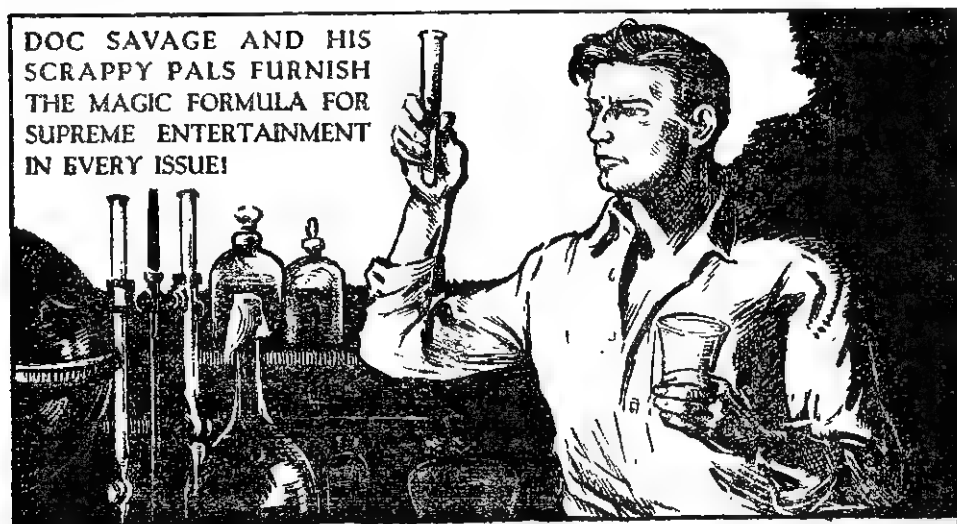
Sudden terror leaped up within him—but no longer terror of the noise of the fight. It was terror at what part of him had become, for he knew the answer. His body *heard* the fine oscillations and pressure differences caused by that other moving body! It was not *like* a bat's hearing—it *was* a bat's hearing!

He shrieked and lashed out with a bare six-inch blow. There was a crash. The man went down. The count was ten. They held up Clews' hand. The roar had never been so deafening. Clews shivered with the pain of that roar, and fell unconscious on top of his man.

He blinked open his eyes and saw men's lips moving. The dressing room was crowded, and the stamp of feet was heavy. But he did not feel them. His eye fell on a cop. He made a sign for the cop's whistle and blew it until his lungs felt ready to break. He gave Ziggy Nelson a happy tap on the cheek and grinned. He looked shyly for his wife.

He couldn't hear a thing. He was himself again.

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“Power”

For this one month, the **Analytical Laboratory** department has been expanded. Since **Astounding** began, it has conducted a type of **Analytical Laboratory**—Brass Tacks. But the results of the analyses have not been published. We have tried to draw conclusions as to the character, the likes and dislikes, of you who read the magazine from the letters. It has, as you can see, helped develop a better magazine because it helped us know what **better** meant to you.

Philosophers and logicians have developed a sort of mathematics of logics. "Let this idea be represented by the symbol A, and this other idea by the symbol B. Then——". The whole purpose of that symbolism is to escape the difficulties of human reactions to words, reactions arising from past experiences. What does **power** mean? A man says "I want **power**!" If he is an electrical engineer, speaking to a group of engineers, he is thinking in terms of kilowatts. If he is a statesman—or a general—or a plain politician—his meaning may be any of three other things.

What meaning that word **power** conjures up in his mind depends on past experiences, his previous environment. It may vary from one purely intellectual concept—the mathematical symbols of an Einstein—to another entirely different purely intellectual concept; the vision of a great statesman.

What, then, is a **better** story? The **Analytical Laboratory** has analyzed and summarized the direct reactions as shown by your letters. Naturally, I'm keenly interested in what you thought of stories I thought were good. But the important thing is the future, not the past. The **Analytical Laboratory** is designed to help me, and the authors, to know what you **will** like even more than to know what you **did** like.

What is **power** in a story, in your estimation? Is it the human power of **The Master Shall Not Die!** or the power of scope and of dynamos in **Galactic Patrol**?

For that is another—an author's—meaning of **power**. That they—and I—may know better something of your viewpoint, your outlook, the **Analytical Laboratory** contains a new data sheet this month. Two items in that data sheet alone are of paramount importance in defining what is to you—and hence to **Astounding**—the meaning of **power** and **better** stories. Age group and occupation I particularly need to know.

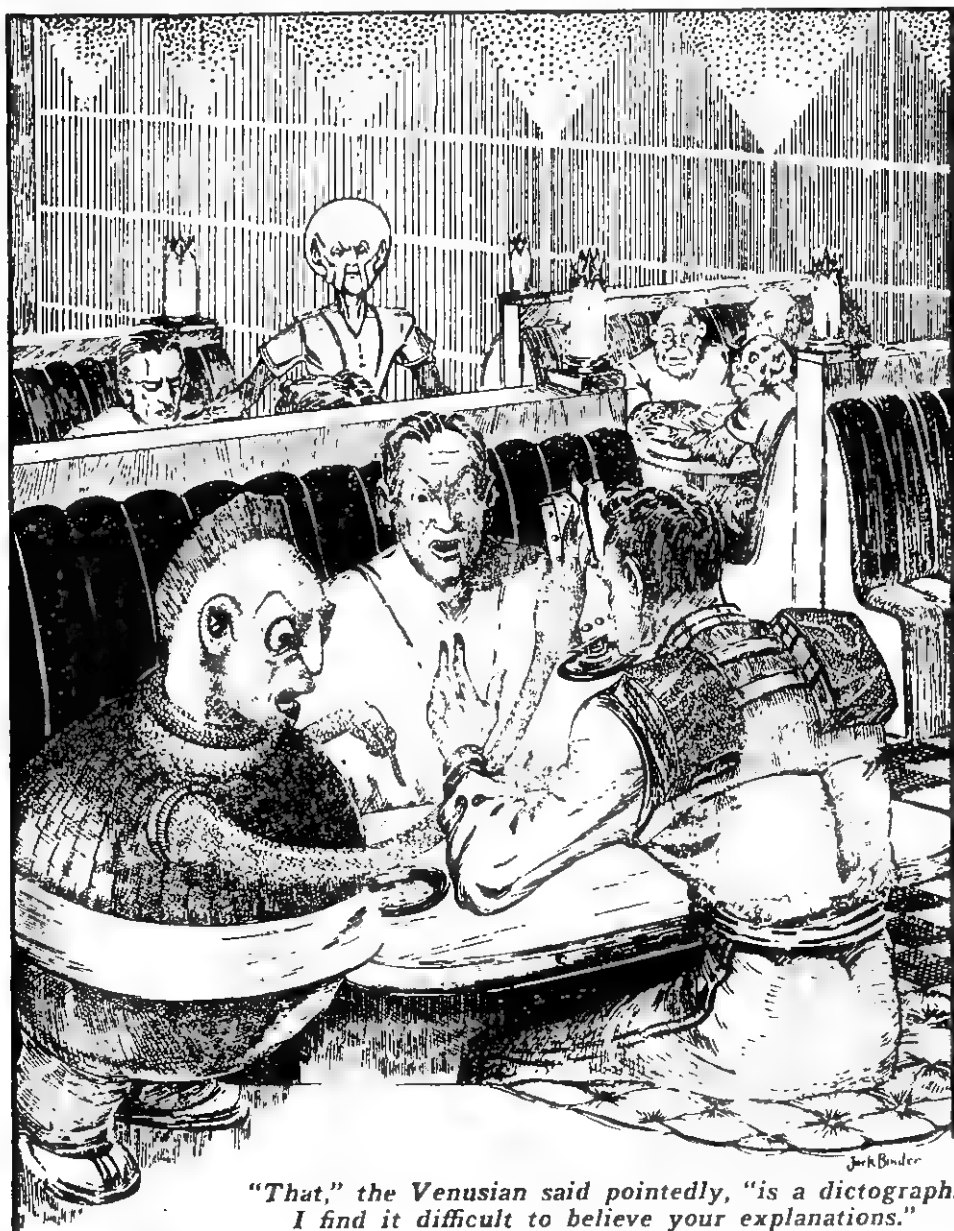
Many who read have never written us comments. I hope that they, too, will aid us in preparing this research data.

The Editor.

ASTEROID PIRATES

by Royal W. Heckman

Concerning the bullet-proof, but highly intelligent Saturnian Apes, and Venusian dreams of Empire—



Jack Binder

"That," the Venusian said pointedly, "is a dictograph. I find it difficult to believe your explanations."

GREG FENNEL dropped to the sidewalk. His toes rapped upon the fused silica, then his gravity repulsor died and his heels settled firmly. He twisted his belt buckle. Magnetic wing locks snapped open. The short wing rolled into a small box upon his shoulders. In a few seconds Greg had become a pedestrian.

Few people were about. All Earthlings, Fennel noted. He was a little surprised at not seeing any balloon-headed, skeleton men from Mars. Or those infernal Venusians! This part of New York was extremely popular with the inhabitants of Earth's neighboring planets. Especially after midnight.

Greg was hungry. The new Interplanetary Restaurant was just around the corner. It was a dandy place to pick up news items for his ten-minute column in the New York *Radio Star*. He made the turn.

A rotund Venusian rolled swiftly toward him. Fennel jumped aside. The Venusian rolled to the outer edge of the walk and went swiftly on his way. The small, round head stuck out from the center of one side like a black hub cap. Greg cursed.

They ought to put a speed limit on those living pinwheels! Of course, with their stubby legs and spherical bodies, the Venusians found it difficult to waddle along a crowded street. But when they lay down and rolled, twenty miles an hour was low gear to them!

Fennel started ahead. The restaurant occupied a ground-floor segment near the middle of the block. The segment adjoining it was still lighted. Greg caught soft strains of Martian music as he passed. The proprietors, two lanky Martians, were sitting in front of one of the ether-phones for which they were the agents. The taller of the two raised his head. Fennel recognized him. He was Harg, the shrewdest spy in the Solar System!

Greg stopped. He looked upward.

He wondered what Harg was doing in New York. But ostentatiously, he was surveying the air lanes above the street.

There were still a few flyers in the Perambulator Lane, the lowest of the three. Most of these were romantic couples flying home with interlocked wings. The Business Lane was entirely deserted. But quite a few green flying-lights were visible in the Speed Lane, and the blue flashes of the Air Police were everywhere. Fennel hardly saw them.

Harg was news. He represented the entire Solar System. He was probably the most important spy in the Interplanetary Espionage. Some day, Greg told himself, he would belong to that. He had already taken the first step. He had been a member of the American Secret Police for over six months.

Fennel sighed and turned away. He'd better not play around with Harg. The Martian was news he did not dare handle. He entered the restaurant.

Bert Lippert conducted him to a booth. Lippert was one-third owner. The other two-thirds was owned by Flan, a Martian, and Bellon, a Venusian. Fennel disliked both.

"Glad you came, Greg," Lippert greeted him. "You've been leaving us out of your air column lately. Why?"

"No news, Bert." Fennel adjusted the arrow on the menu set in the table top and punched the various dishes he wanted. "I don't handle advertising. Give me news and your restaurant goes on the air."

"Listen, Greg." Lippert dropped into the chair on the other side of the table. "This joint is full of news. So full I'm afraid. The biggest blow-up the Solar System has ever seen is due to happen in less than a week. And I'm in it. I don't want to be, but I am!"

"Jupiter Juice?" That soothing, insanity-producing liquor was outlawed. But Greg knew it could be gotten right here.

"Oh, that! Hell, no." Lippert waved the idea aside. "We handle it, sure. You know that. But it's cut below the danger point, and the city police inspect it. Our customers don't know that, of course, or they wouldn't think they were being devilish when they bought it."

"What's the belly-ache, then?"

GREG WAS becoming curious. If something *big* was going to happen, it would explain Harg's presence next door. And if he, Fennel, could uncover it, he would be up for a place on the Interplanetary just like that!

"It's Bellon. That bloated Venusian's getting ideas. He's been hob-nobbing with the folks back home lately. I listened in. Venus wants a colony!"

"Sure she does." Greg admitted it readily. He flipped open a door in the wall and rolled out a steaming tray. Ah! Roast beef flanked by Martian potatoes! And a huge plate of Venusian mushrooms! He started to eat and spoke between mouthfuls. "Sure Venus wants a colony. But she won't buy. The Martians offered to sell Diemos, their smaller moon, a long time ago."

"Aw, who wants that chunk of iron! The Venusians have bigger ideas. They want a planet!"

Fennel carefully laid down his fork. "You mean—Earth?" he inquired softly.

"No." Lippert leaned forward and drew designs on the tablecloth with his finger. "They want the Asteroids. All of 'em."

Greg gripped his wrist.

"Are you crazy, Bert?" Then he leaned back and grinned. "You must have taken a shot of Jupiter Juice. The Asteroids belong to Earth. Why, more than a third of them are peopled by Earthlings! We'd never sell them. As for taking them by force, we could blow Venus to pieces if she tried."

"Sure we could! But she's going to try. In fact, she has already. Notice any funny flashes in the sky lately?"

"Yes, and I know what they were. A couple of the tiny Asteroids collided. Nobody knows why. But no damage was done so we're not worrying!"

"I know why. And I'm worrying, too. The Venusians did that. They're going to assemble the Asteroids into one large planet. They've got a base on Mars, and a bunch of Martians are helping them. There'll be hell to pay in a week or so."

"Wait a minute, Bert. It doesn't make sense, but there may be something in this. How can they assemble the Asteroids?"

"Gravity." Lippert glanced at the row of booths opposite them.

All were occupied. Most of the occupants were Venusians, but there was a fair sprinkling of Earthlings and Martians among them. One booth held three Saturnian apes. They looked savage, but were from a very intelligent race. None took any interest in what Lippert was doing so he went on.

"It's so darned simple, Greg. Look. Your gravity repulsor nullifies gravity, doesn't it? If you turn it on and jump, or get some sort of a send, you keep on going and don't come back until you shut it off again."

"That's common knowledge. What has that to do with this?"

"All right, Greg. Now take the gravity amplifier. You turn one on when you're wearing it and you stand rooted to the spot. In fact, if you turn it on strong enough, the increased gravity will flatten you out like a pancake!"

"Sure. But I still don't get your drift."

"Use your head, Greg." Lippert leaned forward and talked fast. "The Asteroids are scattered along one orbit. They exert more or less gravity upon each other. Suppose two, fairly close together, were to have their gravity for all others nullified and their gravity for each other amplified. What would happen?"

"Why, they'd smash. Say, Bert, that's it! That's what happened!"

"Exactly. The Venusians did that to some so small they attracted little attention. They crashed. There was nothing near enough to attract the flying pieces, and these settled together. A loose, spongy mass. But, as this mass increases, its natural gravity will increase also. The mass will settle and harden. In time, it could be built into a planet."

"It could be. Lord, Bert, this is something big! I'm going—oh, hello, Bellon. Anything in the line of news out in the party room?"

THE VENUSIAN had approached silently. He was less than three feet tall, more than three feet in diameter. Fennel knew that the belt around Bellon's waist, upon which the Venusian rolled, was more than ten feet long. One had to stoop to see the stunted, thick legs. But the arms made up for that shortness by being fully five feet from shoulder to wrist. They had no joints and could be coiled and twisted in a snake-like manner. They were usually wrapped about the Venusians' necks with only a couple feet left to dangle at their sides.

"News?" Bellon lifted his pig-eyes to Fennel's face. "There is news only in this room, Greg Fennel. But news you might hear here is not to be passed over the radio. Is it, Bert?"

Greg said nothing. Lippert was again drawing pictures, tracing them slowly and carefully. He neither spoke nor looked up.

"Is it, Bert?" Bellon repeated.

Lippert jerked erect.

"Eh? No, no! Of course not. I mean—yes, certainly. We need more advertising, Bellon. Greg should give it to us. But he says we've got to have news or we won't be mentioned."

"He is quite right. And did you get the news, Greg?"

"Not what my boss'd call news."

Greg shook his head, as though he regretted the necessity of refusing their request for publicity. "I know you fellows would like to have me start a rumor about your Jupiter Juice traffic. That'd bring results. Maybe a raid. And when that happened, your Juice would be found legal. Nope. Sorry, Bert, but nothing doing."

Lippert caught on. His tone became wheedling.

"Aw, Greg, why not? A few words wouldn't mean a thing to you or the *Star* and would help us like the deuce. Your boss'd never know. And if he did, he wouldn't care."

Bellon bobbed his head and smiled.

"Very nice," he admitted. "If it were not for this"—he coiled a snaky finger around the arrow and lifted the wireless menu from the table top—"I might believe you."

Fennel leaned forward. A dictograph lay before him. He paled. Lippert leaped to his feet.

"You can't get away with this, Bellon," he shouted. "You're going too far!"

"I am," Bellon agreed. "Too far to back out. And you, Bert, it is too bad, but——"

Lippert staggered. A small red dot appeared on his forehead. Two other dots sprang into view beside it. He grabbed the edge of the table.

"Needled!" His breath came in short gasps. "You shot me, Bellon! Greg, tell Har——" He fell forward, then slid off the table and slumped to the floor.

Fennel jumped up. He held a needle pistol pointed at the center of Bellon's forehead. Before he could shoot, the Venusian tipped over on his side and rolled into the next booth. Fennel stepped out upon the floor.

The double doors leading to the party room closed. Just inside the booth room, stood Flan. The Martian propri-

etor was aiming a needle pistol at Greg's chest.

"Put up the gun, Greg," he ordered. "What's the trouble?"

Fennel's lips twitched. He was fully aroused. But he controlled his anger, forcing himself to think.

He had to get out. Had to notify the proper authorities of what had been hatched in the Interplanetary Restaurant. He looked behind him.

The floor was crowded. Each booth had belched its quota of Earthlings, Martians, or Venusians upon the tile surface. Every man was armed, held a needle pistol pointed at him. Except the three Saturnian apes.

THEY HAD not moved. They still sat at their table, calmly eating. But their eyes missed nothing. They were frankly curious, yet their attitude told him plainly that they intended to mind their own business and were not to be drawn into the present squabble. The Saturnians seldom mingled with the rest of the planetarians.

Fennel slowly pocketed his gun. Bellon waddled from the booth where he had taken refuge. He was all smiles.

"Good work, Flan." He nodded to the extremely thin, eight-foot Martian.

Flan lowered his long arm and tucked the pistol under his belt. His enormous head wagged. Fennel always expected to hear the thin neck crack whenever a Martian nodded. But in spite of their delicate appearance, the Martians were an extremely hardy and powerful race.

"What now, Bellon? We can keep up this restaurant farce no longer. Had we not better leave?"

"Immediately, Flan." Bellon turned to where his countrymen had gathered into as close a mass as their girths would permit. "Ganot, go at once and gather our Venusian crews. Have them all roll down to our airport. You will take off at daybreak and go straight to Venus. Explain things to our govern-

ment, and tell them to begin operations as soon as possible. Then lead the air fleet back to the Asteroids."

Ganot bowed. He spoke to the men around him, and most of them followed him through the rear door of the room. Bellon instructed the rest.

"You, Hagal, gather the crews for our Martian base. You will command the Venus detachment and be under the orders of Stor. Stor will lead the ships to Mars, collect our fleet, and load them with all available gravity repulsors and amplifiers. Then head back for the Asteroids. We will be waiting at the meeting place in our flagship."

Stor, a tall Martian, assented with a grim smile. He said something to Hagal, and all but two of the Venusians and four of the Martians left the room. The Earthlings, a dozen hard-faced Americans, remained. Fennel faced them.

"You fellows are in this, eh?" he jeered. "A bunch of traitors! Dupes! If this scheme should succeed—which it won't—you'll get paid in needles from Venusian pistols. You ought to know that. And if it fails, the pay-off will take place right here on Earth. What have you to gain?"

"Plenty, fellow." A big, black-haired man grinned insolently. "We'll be taken care of. None of us are worrying about what's going to happen. We *know*! We're handling the flagship! Bellon and Flan are both riding that. Naw! We got nothing to worry about."

"You see, Greg!" Bellon smiled smugly. "You haven't a chance. Everything is taken care of. And everybody. Even you." He stopped abruptly. He had caught sight of the three Saturnian apes for the first time.

They had finished eating. The three were leaning back in their chairs viewing the drama with visible interest. They were not the least bit frightened or embarrassed. Their only uneasiness, Greg knew, was due to the unaccustomed clothing all planetarians were

forced to don when they landed upon Earth.

Flan grinned good-humoredly.

"It seems, Bellon," he said, "that you had better take care of our unexpected audience. They have heard too much to be left out of our plans now."

Bellon nodded and waddled to the booth. He addressed one of the two facing him.

"What do you Saturnians know?"

THE APE looked up, baring his teeth in an engaging grin. Then he ignored the Venusian and spoke rapidly to his companions. The three gurgled happily, seemed to think something extremely pleasant lay before them. They nodded in agreement. The first again faced Bellon.

"Everything, my dear Venusian. It is perfectly plain, is it not? All of Venus and at least a part of Mars are conspiring to steal the Asteroids from Earth. Since you spoke of taking gravity repulsors and amplifiers there, you must intend to consolidate those small planets into the large globe it once was. Am I right?"

"Too right," Bellon's tone was decidedly unpleasant. "I don't know how you figured it out from the little you heard, but you have done so. You know what that means?"

The Saturnian gurgled again. The other two echoed the gurgle in an equally pleasant manner. "Assuredly, Bellon. But you must not think our intelligence too remarkable. You see, we Saturnians had the same idea several centuries ago, Earth time. But Earth was then exploring the Asteroids so we felt she had a prior claim and gave up the idea. And what it means, my dear Bellon, is this: You must either take us with you or kill us. Am I right again?"

"You are," Bellon declared emphatically. "Possibly you could also advise me what to do about it?"

"I could." The ape nodded sagely.

"But you would not take my advice. Bak, Urg, and I have discussed the matter fully. We think the same. You must kill us, Bellon. Your only hope for success lies in doing that immediately. Unless you do, we will thwart your plans."

Bellon sneered. Flan, evincing the rare good humor common to his race, grinned in appreciation of his partner's discomfiture. The other four Martians and the Americans did the same.

The assured manner of the Saturnians impressed Fennel favorably. He liked the apes. Their facetiousness was not assumed. They were absolutely without fear. If Bellon could be induced to spare them, anything might be possible.

"Monkeying with murder won't help you, Bellon," he warned. "Best leave well enough alone. You've killed an American. Our police will never forget that. If Saturn's police take up your trail also, you'll never escape."

Bak, the largest Saturnian, sat alone on one side of the table. He threw back his head and laughed uproariously. "My dear Greg," he gasped, "pray, do not intercede for us. If it is predestined that we are to die from needle pistols, that shall be our fate." He released another outburst of laughter, then added, "But I fear Jan spoke truly. Bellon will not heed our advice. He will spare us."

Bellon bristled. He knew he was being baited. But he knew, also, that the fearlessness of the apes had excited the admiration of the Martians and their American allies. He forced a smile. "Very true, my dear Bak. Your lives will be spared, but you will honor us with your presence on the trip. Must I add, as prisoners?"

"But, Bellon," Urg looked up earnestly, "you have not forgotten that you cannot succeed while we live? You see, it is foreordained that we block your plans. My advice would be——"

"Enough!" Bellon's patience was at

an end. He turned to his two compatriots. "Search them. Search Greg Fennel also. Make sure they have no weapons of any kind. You men," he addressed the Americans, "bring the surface cars to the back entry. We shall leave for the airport immediately."

GREG ALLOWED the sinuous arms of one of the Venusians to travel over his body. The needle pistol was taken. So were the two extra pellets of ammunition. He even allowed his individual flyer to be lifted from his shoulders. He would have no use for that anyway. It wouldn't work once they were out of Earth's atmosphere, and the spaceships would dive through that in seconds.

The Saturnians were greatly amused. They offered no resistance, and nothing of note was found on them. Not even needle pistols. They wore the outer summer garments adopted by all Earth males and that varied only in color and texture: trousers, sleeveless shirt, and jacket. Greg wondered where they could have bought clothes large enough to fit their enormous bodies.

He saw their true size while they were being hurried along a wide corridor to the back of the building. They stooped forward as they walked, but even then their heads towered above those of the Martians! Each must have weighed over eight hundred pounds. Yet there was something about their stealthy movements that told Fennel they could act with the speed of light when the occasion demanded.

The surface cars were parked close to the building. Two were light trucks with steel vault bodies. Money transports. The rest were brand-new, glass-bodied passengers. The four-foot drive wheels in front were equipped with separate oxy-hydrogen motors, and the glass plow windbreaker told Greg they were speedsters. Capable of five hundred miles an hour.

Flan boarded the first car. Two Martians, a Venusian, and an American got in with him. A vault truck was next. Jan, the Saturnian, gurgled when they pushed him inside. Greg saw a light in the rear of the segment rented by Harg, the Martian spy, and his partner in the ether-phone business. He wanted to call a warning but he knew the building was sound-proof. Then he was hustled into the truck, and the vault door clanged shut behind him.

"What a joyful escapade!" Jan was thoroughly enjoying himself in spite of the cramped quarters. "How happy Bak and Urg must be!"

"They won't be so happy when we reach the Asteroids," Greg said, glumly. "We'll be needled then!"

"My dear Greg," the ape said between gurgles, "we Saturnians are needle-proof. That is what amuses us so greatly. Our hides are very thick, almost puncture-proof. But the hair upon our bodies is our real protection. Needles spin. The hair winds about them tightly and stops them before any damage can be done. Is it not amusing?"

"Very," Fennel answered laconically. "For you fellows."

"Oh, do not become disheartened," Jan hastened to reassure him. "Bak, Urg and I shall certainly stay with you to the very end. We intended that from the start. Otherwise, we should have destroyed the creatures back in the Interplanetary Restaurant."

"If you had," Greg told him, "we could have saved the Asteroids then and there. We could have notified Harg of the Interplanetary Espionage and the Planetary Federation would have taken care of things."

"Ego, Greg. Yes, I am afraid it was ego that forced us to act as we did. But let me explain."

"Because we once planned to assemble the Asteroids, we Saturnians recognized what was taking place when the first collision occurred. We investigated.

We traced the crews to their base upon Mars. We learned that the Venusians were the instigators. We saw that a number of Interplanetary laws were about to be broken.

"We Saturnians have mixed little with the rest of the planetarians. Most of them think we are ignorant savages. We want to join the Planetary Federation as an intelligent people. It would be years before we would be treated as such. But if we can accomplish something spectacular, something that will better conditions in our Solar System, we will win the respect of you planetarians with one stroke.

"This happened. It seemed our chance. Can you blame us if we decided to act without notifying the P. F. or calling for assistance? Bak, Urg, and I came to Earth to begin operations."

"Jan," Fennel found the Saturnian's arm and squeezed it, "I'm with you! I'm only a small cog in the American Secret Police, but when I tell what I know, you can be sure Earth will back your planet to the limit!"

"Well said, Greg. I appreciate that greatly. I——"

The truck stopped. The door was jerked open. Jan and Fennel backed out and slid to the ground. A huge, torpedo-shaped spaceship was before them.

DAY WAS BREAKING. The other spaceships had already taken off. The two were surrounded and hurried through the air locks and into the vessel. Bak and Urg were there. Both wore handcuffs and shackles—and broad grins!

Bellon was still angry. He shouted orders right and left. Jan was handcuffed, and the three Saturnians were sent above under heavy guard. Greg's heart sank when he was left alone.

"You will stay with me, Greg. I have use for you. So long as you behave, you will not be imprisoned." Bel-

lon led the way into the commander's stateroom.

"Sit down, Greg." He motioned to a chair. One of his long arms reached out and pulled a cushioned stool toward him. He slid it under his fat body from behind and sat down.

"You think my plan is foolish, don't you?"

"It is foolish," Fennel stated. "No matter how it turns out, you can't win. You may assemble the Asteroids. That I'll grant. But Venus can never hold them after you do. The Planetary Federation won't stand for it."

"I think they will. What is the only way, except by purchase, that a planet may acquire a colony under the Solar laws?"

"Exploration. Discovery means nothing. Nor does building. It is only by exploration that a planet may claim a new possession. Even conquest does not count."

"True. Earth explored the Asteroids. They were awarded to her. But the product of our work will be a new planet. And the Venusians will explore it first."

Greg laughed.

"That's ridiculous. Our war fleet will surround it until it becomes ready for exploration."

"Suppose," Bellon stressed each word, "the atmosphere of the new planet were found to be saturated with *hulgin* gas?"

Fennel drew in his breath sharply. *Hilgin gas!* The deadliest gas in the Solar System! It filtered through steel. Spacesuits could not keep it out. The merest whiff meant instantaneous death to any planetarian. Any—but a Venusian!

For some reason or other, they were immune. Nobody knew why. It was like their ability to roll; nobody understood how they did it. Greg doubted if they knew themselves. But, regardless of whys and wherefores, the fact still re-

mained that *hilgin* gas did not affect the Venusians.

Suddenly the real meaning of Bellon's allusion came to him! *Hilgin* gas was as scarce as it was deadly. It had been found on only three planets: Venus, Jupiter, and Uranus. Every bit of it had been collected by the Planetary Federation and it had been outlawed. It was now the sole atmosphere of Dorlas, the tiniest of all the tiny Asteroids!

And—Dorlas would be pulled into the forming planet. The gas would be liberated. The atmosphere of the new planet would be saturated. And if it was, none but a Venusian *could* explore the surface!

"I see you understand." Bellon was grinning. "How simple it all is! Venus will not even be connected with this expedition. We are pirates; no one knows us. No one but you and these Saturnians. And rest assured, Greg, that if you do not do as I tell you, you shall be silenced!"

"You're a fiend, Bellon. But there's nothing I can do. Not now, at any rate. So I'll listen to what you've got to say. Go ahead."

"We want your voice, Greg. On the air. Your ten-minute column is heard all over Earth. We can manage to have it heard all over the Solar System. We can make you the greatest newspaper attraction in the Planetary Federation."

Fennel remained silent.

"You need only excite public opinion in favor of Venus. We are not highly esteemed. You can make everybody respect us. And convince the world that the new planet must be considered a free agent open to exploration by any willing to undergo the dangers of its atmosphere!"

Fennel said, "Go ahead, Bellon. Needle me. You know I will never agree to that."

"Suit yourself." Bellon stood up. "We will be there in forty-eight hours. You need not decide until then. Of

course, I hope you will agree. But we shall go ahead whether you do or not. You are not vital to our plans."

He waddled to the door, then stopped. His long finger pointed.

"Your stateroom. You need sleep, Greg." He slammed the door.

TWO DAYS later, Greg stood peering through the transparent side of the ship. Flan stood behind him. His bony hands rested on Fennel's shoulders. Bellon was seated on a low stool near by. He pointed.

"There it is, Greg. You can still decide."

A green mist drew rapidly nearer. Fennel watched it thin, saw the rays of a clear Sun strike the surface of the black ball about which the mist swirled. Dorlas. The Deadly Dot of the Solar System!

His shoulders straightened. Flan's fingers tightened their grip. Fennel was trembling.

"You *have* my answer." His voice was low and husky. He turned so quickly Flan's hand slipped from his shoulders. The Martian grabbed his arm. "Offer me something else, Bellon! Forget this wild scheme of yours. Leave the Asteroids alone! Grant the Saturnians and me our liberty and I'll do anything you ask!"

Bellon laughed. "No, no, Greg. That shall never be. Look! It is now too late!"

He pointed again. Pin-points of light showed through the blackness. Red, yellow, green; red, yellow, green. Fennel had heard enough to know what they meant. The battleships of Venus were approaching the Asteroids.

Flan loosened his grip. The Martian pointed.

"There! Below us! Mars!"

He was right. A long row of red lights was rising from beneath them. The Martian Pirates. Fennel groaned.

Bellon murmured, "What wonderful

timing!" then kicked his stool away and stood up.

"Quick!" he called loudly. "Man the searchlights! It shall be the honor of the flagship to plant the gravity repulsor and amplifier upon Dorlas!"

Thick beams of light shot through the darkness. Answering beams reached toward them. The flagship settled slowly, hung above the mist that hid the surface of Dorlas. The fleets deployed. Dorlas became the hub of a wheel of light.

Venusians climbed into spacesuits. Flan, who had directed the placing of the repulsors and amplifiers in the air lock, came rushing back. He was grinning. "Bellon! An idea just occurred to me. Would it not be nice if we were to allow Greg to assist the crew that boards Dorlas? Think of the honor!"

"Flan!" Bellon's eyes lighted joyfully. "What a beautiful idea! I almost believe you're sentimental. Greg shall have the honor!"

"No!" Fennel shouted hoarsely. "Needle me! Do what you want! But try to send me down in that poison, and I'll kill you!"

Flan laughed. His needle pistol was in his hand. He stepped forward. Without warning, Fennel dove.

Greg's shoulder hit the Martian hard. Flan doubled up. His grip loosened, and needle pistol dropped from his hand.

Fennel twisted. He caught the pistol and spun it about. A stream of deadly needles shot from the barrel.

Flan sagged. Greg gripped his body and held it before him. Bellon shouted.

The pirate crew sprang forward. Greg backed away, spurring needles into their ranks. That held them back. He reached the stairway, shouted, "Jan!"

There was an answering roar from above. Greg hesitated. Jan roared again. Bak and Urg joined in.

Greg sent a volley into the squirming

mass before him, drove the pirates back across the compartment. He dropped his human shield and leaped upward.

HALFWAY up, Fennel stopped. An American stood at the top of the stairs, his pistol pointed at Greg's head. Greg leaped aside. Needles whined past his ear, and shouts of pain and rage came from the pirates below. The American above cursed. He dropped his gun, leaped on Greg, and swung a long-bladed knife.

Fennel ducked. The knife slashed his shirt, opened a long gash along his ribs. He pulled his pistol free and jerked the trigger.

The American folded up and rolled downward. Fennel followed his fall with the gun barrel, squeezing the trigger. Nothing happened. He threw the empty gun and raced to the next deck.

Jan roared, "The switch! The switch!" Greg found it, jerked hard on the handle. Magnetic locks clicked and three barred doors spun open.

Bak led the rush. He smashed into the pirates on the landing, pushed them back upon the stairs. Then he leaped among them, growling like the ape he was. Bellowing, Urg hurled himself into the fight.

Jan stopped. He lifted Greg tenderly, holding him erect in his powerful arms. He was laughing.

"What an experience!" His eyes danced merrily. "Delightful, Greg. Really delightful! I'll never get over this, never! Let me help you, my dear Greg."

Fennel tried to pull away.

"Never—mind—me," he gasped. "Bak and Urg—they're down there fighting!"

"Of course they are!" Jan held up his hand. "Just hear them! But I could not interrupt; they'd never forgive me. Come, Greg. It will all be over by the time we get there."

It was. The compartment was a shambles. Bodies, ripped and torn,

were strewn about. Bak's clothing hung in shreds. He pranced about, a hairy ape, vainly seeking some living thing upon which to pounce. There was no sign of Urg.

Bak saw them. His fists clenched and smote his heavy chest. Then his hands dropped to his hips and his head tilted upward. Roars of laughter burst from his lips.

"Wonderful! Greg, you must accept my thanks. And Jan, you acted superbly. How could you resist joining us?"

"When there is not enough for one, should two divide?" Jan's eyes twinkled. "Should the occasion arise, I shall expect the same of you. Urg is already at work?"

"Yes. Urg was very sportsmanlike. He saw he was not needed and took charge of the ship immediately. But he did take four of the Americans from me. He said he will need them to man his ship."

Greg leaned against the wall. He fought the searing pain in his side and tried to listen to what the Saturnians were saying. But his eyes kept wandering.

Bright flashes appeared and reappeared among the spaceships of the pirates. Monstrous, soundless explosions lighted the void. Luminous beams swung through the blackness, followed the twisting hulls of gigantic air cruisers. Myriads of colored lights danced through space.

"Fellows," he said, weakly, "you've been great. But we're still in the fire. The pirates are out there—they're doing things. We've got to get word——"

"Forgive me, Greg." Bak lifted him as though he were a child. He pulled a long table to the center of the room and laid Fennel upon it. "I'd forgotten you were wounded. As for the pirates, they are well taken care of."

"What are you talking about?" Greg

struggled to sit up. "We haven't had a chance to send a warning!"

Bak straightened. He folded his arms across his chest and looked stern.

"Fennel, I want you to lie down while I treat your wound. Are you going to do so, or must I get rough?"

"No." Greg solemnly shook his head. "I saw you get rough, Bak. I'll lie down."

"Now," Jan handed Bak a Venusian first-aid kit and turned to Greg, "I'll tell you what happened." He parted the thick hair on his chest and exposed a bright metal disc. "An ether microphone," he explained. He folded his ear back. Another disc, somewhat smaller, had been concealed there. "A receiver. We have never been out of communication with Saturn since we left our planet."

BAK OPENED Fennel's shirt and his long, powerful fingers explored the ugly gash. Greg winced with the pain of it. Jan said, "He's not an ape!" and Bak grinned sheepishly. He smeared a thick salve along the wound. Before he had begun to apply the bandages, the pain had almost disappeared. Jan continued.

"Our people were informed of every move we and the pirates made. Our spaceships reached the Asteroids first and waited for our signal to begin the attack. By this time, the pirate ships are all either destroyed or captured."

"We told Harg, of the Interplanetary Espionage, about the base on Mars and the restaurant in New York. He promised to take care of both. Earth was notified, and their air fleet left at once to surround Venus. We purposely allowed the Venusian fleet and that of the Martian Pirates to come here that our people might establish themselves as worthy planetarians by capturing them. Do you forgive us, Greg?"

"Forgive you? Lord, Jan, there's

nothing to forgive. I want to thank you!"

Bak pressed the last strip of adhesive tape in place and helped Greg to his feet. Greg felt no pain but was stiff and weak. He pointed to a case of Martian wine and said, "Let's celebrate." Jan placed a bottle and three glasses on the table.

Somebody said, "Another glass, please," and Urg entered the compartment.

"A wonderful victory," he told them. "The Martian government smashed the base on their planet and the Venusians are already suing Earth for peace. Our fleet," his voice vibrated with pride, "had no trouble here."

"A fleet under your command will never have trouble, Urg," Jan spoke softly, then turned to Greg. "Urg is admiral of the combined war fleets of Saturn."

Fennel gaped as Urg bowed. He muttered, "Holy mackerel!" but Urg only smiled.

"I'm only a lesser light, Greg. Jan is president of the United Nations of Saturn, and Bak is our trouble-loving army commander."

Jan laughed. "It would come out. Now that you know, Greg, won't you accompany us to Saturn? Our planet has never been explored by a planetarian, and we will give you full rights to re-

port actual conditions there to the whole Solar System."

"And I'll take you around!" Bak's eyes glistened. "In state, Greg. See everything—do anything. Think of your paper!"

Greg was thinking of it. Revealing the mysteries of Saturn would make him the greatest figure in the news world. Not on Earth—in the whole System! His ten-minute column would be stretched to a half hour—an hour! His salary? Hell! In a month he could retire with more money than he could ever throw away. Man, what a break!

One of the Americans cautiously stuck his head in the doorway and held out a sheet of paper. "Ether message for Greg Fennel," he explained. Greg took the message and read it slowly.

"You are accepted as a member of Interplanetary Espionage. Report to Harg at Gorgas, Mars, immediately. Transportation arranged to Diemos, where you will investigate deaths of four planetarians in Diemotian iron mines. Your number 11-38-962. Signed, Paul Dunning, Chief. Interplanetary Espionage."

Greg's eyes swam. He looked at the three Saturnians, saw their pleased grins give way to puzzled disappointment. Then his shoulders squared.

"Sorry, fellows. That trip will have to wait. I've got me a job!"

IN TIMES TO COME

NEXT month's issue closes five full years of Street & Smith's management of *Astounding*. That issue is going to typify the five years of work and advancement *Astounding*—and science-fiction—have undergone since the Street & Smith *Astounding* first appeared in September, 1933. Manly Wade Wellman's *Treasure Asteroid* appears on the cover—and that cover is by Thomson. That typifies our effort to find new, good cover artists.

There is one of Ray Cummings' best short stories—*X1-2-200*—to represent the best of the old. Kent Casey, a new author who has already established himself as a top-notch represents the best of the new. He's there with *The Ceres Affair*—returning John West and the irrepressible if slightly irrational Dr. von Theil.

And Eddin Clark represents two new policies: he's a new author who has never before appeared, and his yarn *Double! Double!* represents one of the most completely, delightfully batty, yet biologically sound yarns I've ever enjoyed. For those who like their science-fiction strait-laced and grim-faced—no. But for those who enjoyed *Anachronistic Optics*, *Flareback*, *Hyperpelosity* and *Good Old Brig!*—yes, by all means. For them, Eddin Clark is a find.

Finally, we start a new serial, *The Tramp*, by L. Ron Hubbard. And that represents, for *Astounding*, the effort to get the best stories of the science-fiction type by the best authors available. It's a three-part story of an utterly insignificant little tramp, a shiftless no-account who was kicked off a box-car, to fall on his head. He woke, still insignificant, still timorous, still dull-witted as ever. But he'd gained a terrible power, and then someone with an embittered, keener mind took him in hand, led him, pushed him, to a mad domination of the country. By the power of his eyes!

The Editor

THE ANALYTICAL LABORATORY

1. Men Against the Stars	Manly Wade Wellman
2. Seeds of the Dusk	Raymond Z. Gallun
3. Isle of the Golden Swarm	Norman L. Knight
4. Legion of Time	Jack Williamson
5. Three Thousand Years!	Thomas Calvert McClary

Second only to *Men Against the Stars* in reader approval was the astronomical cover. *Men Against the Stars* led all other stories by 28%—the cover, however, trailed it by only 10%.

ABOVE, we present the *Analytical Laboratory*. Below, something new. *Astounding* has been running this Laboratory department for several months now. You've analyzed the authors and their stories. Now they want an about-face. They want a chance to analyze you so that they may know better your likes and dislikes, the type of experience the people they write for have had.

This is a research data sheet. We'd like to have you express yourself freely and honestly. This is, after all, an analytical laboratory, and exact results depend upon your answers.

— — — — — Please clip and mail before August 1, 1938 — — — — —

Orbits, Take-offs and Landings

An authoritative article on the actual maneuvering possibilities and necessities of rocket-ships—and the neglected First Law of Rocketry—

by Willy Ley

WHILE actual rocket experimentation is struggling along, irked and delayed by little mishaps like valve troubles, melting combustion chambers or just plain lack of funds, science-fiction authors find no difficulties in having their space liners run freely from Mars to Jupiter and from Earth to Mercury. Thus far things are all right; it is the duty of science-fiction to point out what might be.

However, our science-fiction authors should not point out what cannot be without saying so. In the case of spaceships, many readers—and even a good many of the authors—seem to think that spaceships, if they were only in existence, could navigate the void as easily and as voluntarily as the Atlantic Ocean is navigated by the *Queen Mary*, the *Normandie* and the *Bremen*.

If the villain who stole the Martian princess cannot be found on Vesta, the hero heads his good—although somewhat scarred and battered—ship straight for Venus, where the villain probably is hiding. This may sound reasonable in the story—if it is a good yarn at all—but it would be simply impossible in reality.

Spaceships cannot travel in straight lines!

This sentence might be called the First Law of Interplanetary Travel. It differs from ordinary long-distance travel not only by the magnitude of distance

and by the means of transportation.

The "law" that spaceships cannot travel in straight lines is valid no matter what distance is to be traversed. But it works only for self-respecting spaceships propelled by a drive based on the principle of action and reaction as stated by Sir Isaac Newton. It does not hold true for "big tear-drops" with Bergenholms and inertialess drive. They might do anything and do it in stories. But spaceships of "normal" design—spaceships as they are now visualized by the more imaginative among rocket enthusiasts—are bound to obey certain natural laws, laws that are firmly established and can be checked at any time by any telescopic measurement.

To understand the underlying principles of space flight one has to begin with elementary facts. Any spaceship, whether it was built in an honest factory on Earth or by some scheming alien entity on another planet, has to start its journey from some planet—i. e., from a moving base. Thus it happens that its velocity in space—with reference to the center of the Sun which might be assumed immovable—is determined by at least two factors: the orbital speed of the planet, and the speed of the ship herself.

Usually, the speed of the surface of the planet at the point of departure (due to the daily rotation around the axis) will introduce a third, and oftentimes

disturbing factor. This might be eliminated by taking off from a pole, but although such a maneuver might make calculations easier, it might not be desirable in actuality as we will see later.

To simplify the problem, let us assume first that the whole planet has to be propelled through space, and that we undertake to do it with our own planet, Earth. Disregarding the difficulties arising from the daily rotation we then have the following situation:

The Earth travels in its almost-circular orbit around the Sun at a speed of 29.7 kilometers per second. This speed is just sufficient to create enough centrifugal force to counterbalance the Sun's attraction at the actual distance from the Sun. Inside the orbit of Earth travels Venus—naturally with a higher orbital speed, since it is nearer to the Sun and has more gravitational attraction to counterbalance. Mars travels outside the orbit of Earth around the Sun, its speed is less than that of Earth. The following table shows the orbital speeds of the major planets; it is easy to see how it diminishes with the distance from the Sun.

LET US imagine that some force suddenly reduced the orbital speed of the Earth. It would not jump into the orbit of Mars or of Jupiter as might be thought. On the contrary. The Earth would start falling toward the Sun. If Earth's orbital speed were in-

stantaneously reduced to zero it would fall into the Sun in a straight line. This would not even be deplorable, since the sudden stop would have changed the planet into a mass of flaming wreckage anyway. If, however, even a little orbital velocity were left, the planet would *not* fall directly into the Sun. It would move in an elliptical orbit, determined by solar attraction and the remainder of orbital speed. The Earth's orbit would change from a near-circle to a long-drawn-out ellipse, with a perihelion close to the Sun. To the living beings on Earth, from amoeba to man, such a change of orbit might be catastrophic, but the planet itself would survive it.

If the orbital speed were reduced only about ten per cent, the Earth would start falling toward the Sun. It would spiral nearer to the central luminary, but while approaching the Sun, its speed would increase like that of a falling stone, until a point and a speed were reached that reestablished an equilibrium of some new order. After some time, the planet would again have a stable orbit around the Sun—not the same as before, but equally stable.

If the orbital speed of the planet were increased, the opposite effect would take place. The planet would begin to spiral away from the Sun, using up energy while doing so, and more and more decreasing its speed. As the upward motion of a thrown stone comes finally to a

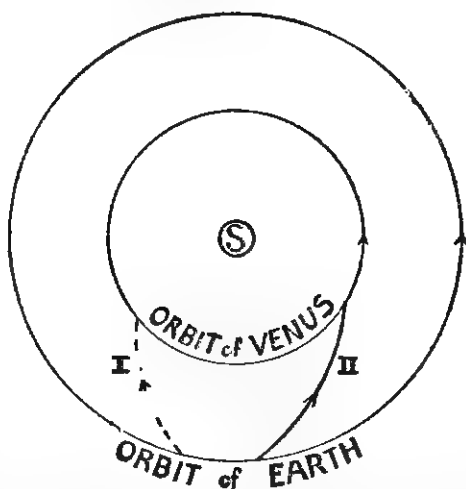
Name	Mean distance in million kilometers	Time of complete revolution	Orbital speed in kilometers per second
Mercury	58	88 days	48.1
Venus	108	225 "	35.2
Earth	149½	365.2 "	29.7
Mars	227	687 "	25.9
Jupiter	777	12 years	13.1
Saturn	1,424	29½ "	9.67
Uranus	2,864	84 "	6.84
Neptune	4,487	165 "	5.46

stop, the outward motion of the Earth would come to a stop after a while. Equilibrium would be reestablished, the planet would have a new orbit outside its former orbit and with smaller orbital velocity. It may sound surprising, at first, that an increase of orbital speed would result in an orbit with lesser orbital speed, but it is nevertheless true.

What can be done to the whole planet in theory can be done to a part of it in practice—if we are “skilled in the art.” When we fire a gun vertically at dusk or at dawn the shell—as seen from the Sun—undergoes a change of orbital speed, either an increase or a decrease. If the difference were only large enough, the shell might travel to the orbit of Mars (if its own speed added itself to the orbital speed of Earth) or to the orbit of Venus (if its speed subtracted itself). And if the shot was rightly timed—i. e., if the shell needed the same time to travel the distance between the orbits as the moving targets of the planets needed to arrive at the meeting place—the shell might even fall upon one of these planets.

We know nowadays—Ziolkovsky, Oberth, Goddard and a lot of others taught us that—that rockets are better suited to obtain high velocities than shells. Therefore spaceships and rocket-ships have justly become synonymous, although one might imagine a spaceship that is not a rocket-ship, and one can certainly imagine a rocket-ship that is not a spaceship.

Although some may try to imagine a spaceship that is not a rocket-ship, the only means to conquer space we *know* of is by rockets. For this reason alone the theory of interplanetary travel should be based upon the laws of rocket motion. The first scientific calculation of this kind—made around the year 1900 by the Russian school teacher Konstantin E. Ziolkovsky—concerned a flight to the Moon—just the one case that happens to be an exception from the



Impossible and possible orbits to Venus. Orbit I is impossible, since when the ship reached Venus, planet and rocket would be moving in opposite directions. For landing, then, fuel would be needed to halt the rocket's motion, then reverse it, and bring it up to Venus' velocity. Orbit II is possible since rocket and planet would meet traveling in the same direction at nearly equivalent speeds.

general rule! Afterwards, the matter rested uninvestigated until in 1925 one of the construction engineers of the city of Essen (Germany), Dr. Walter Hohmann, published a treatise that was devoted almost exclusively to the orbits of spaceships. Dr. Hohmann did not treat problems of construction or operation in his book; he merely stated his faith in the rocket principle. Then he concentrated his attention upon the astronomical aspects of interplanetary travel. One of the first things that occurred to him was the realization that our Solar System is fairly well suited for interplanetary travel. All of its planets, and practically all of its moons, circle the Sun in very nearly the same plane. And—which is even more important—all the planets and the vast majority of the moons travel in the same direction.

If either of these facts were different the hopes for interplanetary flights would have been destined to remain hopes. One could never hope to land

on a planet "Mars II" that traveled in its orbit just as real Mars does, but in the opposite direction. One could hardly hope to reach a "Venus II" traveling in an orbit the plane of which formed an angle of 90° with the plane of the orbit of Earth. This is true because one cannot steer in space as one can on Earth. On Earth, if an airplane wishes to change its direction 180° —to turn around completely—no power need be expended. The fins are set at an angle, and the necessary force is obtained by reaction with the air. In space, fuel must be burned whenever a change in direction is made. To turn through 180° , as would be necessary to reach "Mars II," fuel enough would be needed to overcome Earth's orbital speed, plus fuel to match the orbital speed of "Mars II," plus the fuel needed to climb out the 50,000,000 miles or so against solar gravity. To reach our hypothetical "Venus II," a turn in direction of 90° must be made. Curiously, the spaceship which cannot travel in a straight line, cannot curve its course by its own volition either! Or, at least, cannot economically do so.

Things being as they are, interplanetary travel is within the bounds of reason. The problem becomes solvable if powerful rocket motors and applied astronomical mathematics are used as tools. Now, in 1938, it remains to build better rocket motors. They are still too heavy and do not last long enough.

TO DEMONSTRATE the problems in question as simply as possible, Hohmann divided interplanetary trips into several parts. Part One was the departure from Earth, Part Two the attainment of the proper orbit, Part Three the correction of the orbit and Part Four the landing on the planet. An example of this method of division might be interesting.

If the ship is bound for Mars, it has to increase the speed it has with refer-

ence to the Sun as part of the Earth. Hohmann wanted it to take off from the planet in the general direction of the Sun and to attain a distance of about 800,000 kilometers from the center of the Earth. Although this distance is small as astronomical distances go, it would practically eliminate the attraction of the Earth. Hohmann wanted the ship to go sunward first only for the purpose of having the planet (Earth) always fully illuminated so that mistakes might be easily checked. According to Dr. Hohmann's calculations, the distance mentioned would be attained in about 15 days. At the end of this time it would have separated from the Earth, but seen from the Sun it would still travel with the orbital speed of Earth. In short, the ship would be a small part of the planet, separate and independent, but still behaving exactly like the planet itself.

After this is accomplished, the rocket motors would have to resume work to "disturb" the orbit in such a way that the new orbit that would be created would extend between the orbits of Earth and Mars. It would be an ellipse of fairly high eccentricity, just touching both orbits on either end, but not crossing them. A few days later, some corrections of the orbit might have to be made, and then there would be no work left for the pilot except waiting till the orbit of Mars is reached. If the ship departed at the right time, Mars would be due at a selected point of its orbit such as to meet the spaceship and catch it in its gravitational field. Then, landing would follow.

Expressed in figures of velocity, the whole operation looks as follows: The ship has to attain a speed of 12—14 kilometers per second to climb to a distance of 800,000 kilometers, and leave the gravitational field of Earth¹. For the

¹) The ship is still in the gravitational field of Earth, of course, if we understand the term strictly. But at this distance the influence is so feeble that it can be safely disregarded.

change of orbits, another 3000 meters per second are needed; for the correction, exactly 320 meters per second. Together, 15,320—17,320 meters per second. The uncertainty is due to the unknown factors of air resistance. It might be well to mention that the time the rocket motors are in operation during this trip is ridiculously small. The first and greatest change of speed does not take more than about eight minutes if undergone with an acceleration of about four gravities. All in all, the rocket motors will have to work for a little over ten minutes from the moment of the take-off from Earth until the ship is ready to go into landing maneuvers for landing on Mars.

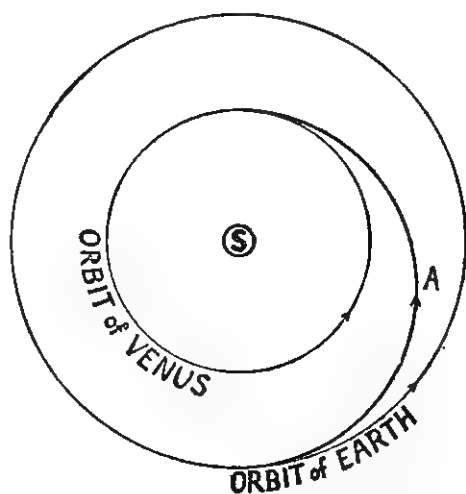
Dr. Hohmann's method of calculation has been both praised and criticized by other authors, notably by Professor Hermann Oberth and Count Guido von Pirquet. They praised it for its pioneering value and for its simplicity; criticized it because it is not the optimal solution of the problem. Professor Oberth's improvement of the method has been termed "the problem of condensation of powered flight". It is true that firing the rockets three times looks a little amateurish if the three necessary changes in velocity can be attained in one sweep. It is also true that a considerable amount of fuel can be saved if all necessary speed changes are compressed into one operation. The reason for this saving has to be sought mainly in the fact that the rocket motors would work with lower efficiency in the second and third firing because of the lower speed of the ship. If all three changes are accomplished together, the ship has generally a higher speed and therefore the rocket motors have a higher efficiency.

As a matter of fact, Hohmann mentioned later that he is in favor of condensing the period of powered flight himself. There are cases, however, where it would be advisable *not* to condense, because several periods of firing

would prove advantageous. Such a case would present itself if the ship had to leave one of the moons of Jupiter. Jupiter's bulk could be used to assist the rocket motors of the ship. Departing from the moon would not need an excessive amount of fuel. Then the ship would fall in the general direction of Jupiter and thereby increase the speed. At a certain instant, the rocket motors would have to force the ship into the right orbit. Just when this change has to be made will vary from case to case, and will be the main worry of the pilot who is unfortunate enough to be assigned to the plotting of such a course.

TO CONTINUE with the discussion of those orbits that are the rule and not the exception, it may be said that substituting Oberth's for Hohmann's method changes neither the appearance nor the underlying principles of flight. It is only a more "professional" way of accomplishing the same thing.

The time needed for a flight to Mars in what Hohmann calls his "Orbit A"



Typical Hohmann A Orbit from Earth to Venus. This type of curve represents the flight-plan to be followed for minimum fuel consumption in interplanetary flight. The curve represents one half of the orbit an asteroid circling the Sun in such a way as to just graze both Earth's and Venus' orbits would follow.



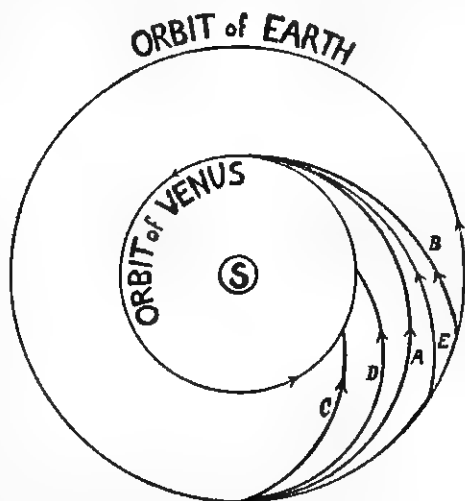
The curious J-shaped orbit-curve for the most efficient Earth-Moon flight. Curiously, rocket-flight demands the most powerful motors known to man—yet rocket-flight is almost 100% unpowered flight! Like the glider, to be efficient, the rocket must travel on the interplanetary "winds" of space—gravitational force.

would be 258 days, but a round trip could not be made in twice that number of days. It would take much longer.

In speaking about interplanetary trips in the literal sense of the word—trips between two planets and not trips between a planet and its moons—one has always to remember that there exist two basically different types of orbits. Those we discussed up to this point are orbits obtained by changing the orbital velocity relative to the Sun. These "A orbits" are the ones most easy to accomplish if judged under consideration of minimum fuel consumption. The B, C, D, etc., orbits are obtained with changes of or-

bital speed and direction. Since *all* orbits are elliptical—although only part of the ellipse is actually traveled—one can also say that an ellipse that *touches* the orbits of the planets of departure and of arrival is an A orbit, while an ellipse that *crosses* the orbits of the planets of departure and of arrival belongs to one of the other classes.

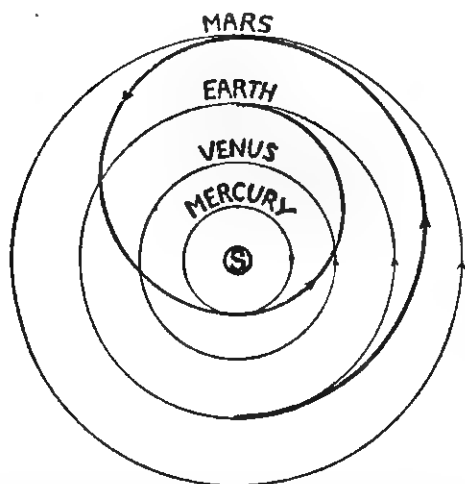
The A orbits are inexpensive, but take a long time. Furthermore, they cannot be traveled at any time desired. A trip to Venus in an A orbit takes 146 days. Provided that the ship took off from Earth 146 days before Venus arrived at the meeting place, the planet will be reached in this time. The rocket-ship would then have traveled exactly one half of the ellipse. (This is, incidentally, another peculiarity of A orbits. Always half of the full orbit is traveled while the parts of all other orbits traveled constitute much smaller fractions.) But if we assume that the travelers have meanwhile decided *not* to visit Venus, they could not just drift on. The other half of their orbit would carry them back without any fuel expenditure to the orbit of Earth all right—but mother Earth



The Hohmann Orbits A, B, C, D, and E. While C is the shortest and fastest orbit, the accompanying table shows that it requires an unmanageable amount of fuel.

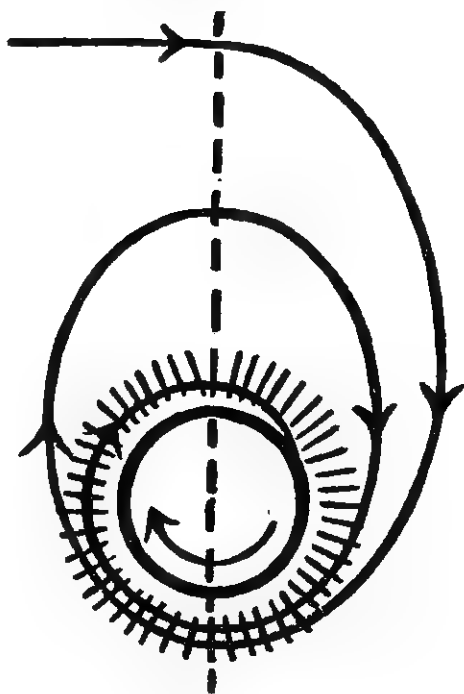
would be somewhere else. The space navigators would have to stay near Venus for a considerable length of time until the other half of the orbit "fits" again. In the case of a trip to Venus, the time of waiting would be 470 days, so that the entire trip would take 146 plus 470 plus 146 = 762 days. The trip to Mars and back would take 258 plus 455 plus 258 = 971 days. Curiously enough, the trip to Mercury would take a much shorter time, due to the high orbital speed and short orbit of the smallest planet. The figures read 105 plus 67 plus 105 = 277 days. A trip to Jupiter would take 2207 days; 997 for each crossing and 213 days' stay. But both of these trips look impossible now because of their tremendous fuel expenditure.

Before Dr. Hohmann computed the A orbits, he made a comparison of five possible orbits. Assuming that the spaceship's own weight after exhaustion of all of the fuel on board would be as low as six tons, he found the following



The "survey-round-trip" orbits making grazing contact with Mars, Venus, Mercury, and Earth in a little more than $1\frac{1}{2}$ Earth-years. It is compounded of A orbits for Earth-Mars, Mars-Mercury, and Mercury-Earth. By proper choice of season, the orbit can be made to pass near Venus en route.

AST—9



Orbit-curves for landing on a planet having an atmosphere. Nearly all the energy to be dissipated by the rocket is absorbed by the planetary atmosphere, with a minimum expenditure of fuel.

figures for the weights of the ships at the moment of departure:

	km/ velocity of				sec.
	3	4	5	10	
On orbit A	49	34	27	18	tons
B	530	200	104	31	"
C	5900	1060	417	60	"
D	141	70	48	22	"
E	172	83	55	24	"

It is evident that the shorter orbits B, C, D, and E, remain impossibilities until fuels of very high exhaust velocities are found or made. Nothing hinders us, however, from having spaceships before that time. Even if more powerful fuels are available, space flight will probably start with A orbits, and if a prophecy as



Oberth's "Curve of Synergy", a compromise between atmospheric resistance, planetary rotation, and the necessity of getting the rocket to a high speed as quickly as possible.

to the first A orbit actually traveled must be made, I should say that it will be the one leading to Eros. Before this, the Moon will probably have been reached, on a particularly uninteresting route that looks like a long drawn-out S rather like the integral symbol \int .

SHORTENING the time needed for a trip to, say, Mars, is possible even with A orbits under condition of not landing on the other planet. The waiting time can be saved with a fairly low additional fuel expenditure in combining a number of A orbits. Dr. Hohmann worked it out once, mainly to see what results he would obtain. He was much surprised to discover that a round trip to Mars could be made in about 510 days instead of 971 days. The ship would have to run in an A orbit to Mars first, observing the planet at close quarters for several weeks. Then it would change into another A orbit with a perihelion inside the orbit of Venus. At the perihelion, another change would be made to come into another A orbit leading back to the orbit of Earth, and to Earth itself. Since the perihelion can be pushed even closer to the Sun without loss of time so that the orbit of Mercury is touched, the travelers will be able to see Mars, Mercury and, probably, Venus at close quarters. And this "survey round trip," as the Germans call it, would not take much longer than $1\frac{1}{2}$ years.

That the spaceship would not land on Earth as straight as a homing pigeon

lands on its roof goes almost without saying. Professor Hermann Oberth, in his very first publication, devoted much time and space to prove that this cannot be done.

"Naturally," he wrote, "manned space rockets are not supposed to descend to Earth in a straight line, because of the comparative shortness of the distance where the air is dense enough to brake the fall. Since a manned rocket has some sideward motion at any event, especially when the departure did not take place vertically, the rocket approaches Earth on a curve of the second order that can easily be influenced in such a way that the point nearest (the surface of) Earth is situated in the upper atmosphere of the planet. Even if we assume that the layer where the parachute can be safely and effectively used is not thicker than 4-5 miles (higher up the air is too thin, farther below the health of the passengers will be endangered by too rapid deceleration), and even if the rocket approaches Earth in a parabolic orbit the 'braking way' is more than 800 kilometers long (840 km.). The result of using the parachute during every meter of this long way does not have to amount to more than to reduce parabolic to elliptical velocity. If this happens, the rocket would approach Earth again at about the same point, and again travel through the atmosphere. This time the 'braking way' would be longer because the elliptical orbit would be less eccentric, i. e., more similar to a circle. The point closest to the surface of the Earth would, however, *not* be much nearer to the surface than before. This would be repeated until circular velocity is obtained. Then the 'braking way' would become indefinitely long, and the rocket would land in a spiral as long as desired."

The whole maneuver will take about 24 hours, maybe less. There is no doubt that it does not look very convenient, and that a landing on flaming

rocket jets would look much nicer. But if we consider that reducing a speed of 12 or 14 kilometers per second to zero takes as much fuel as attaining such speed, and if we remember that the fuel needed for this maneuver has to be carried along through all other maneuvers—right from the take-off—we do not mind a series of circumnavigations so much.

THERE IS one thing left to discuss: the take-off. One should think that at least this will be done in a fairly straight line, if for no other reason than to penetrate the densest layers of the atmosphere quickly. As far as these densest layers are concerned, this argument actually holds true. But the take-off of a spaceship (and of any other large rocket) will most probably not be made from the surface of a large lake or even the sea, as one often reads in foreign publications about space travel.

Calculations published by Ley and Schaefer in *l'Aérophile* (Paris, October issue, 1936) have shown that a given rocket, which would attain an altitude of 26 kilometers if launched from a point at or near sea-level, would reach much higher altitudes if launched from the top of a high mountain. If the mountain be four kilometers high, the total altitude attained would be 43.4 kilometers (instead of 26 plus 4); if the mountain be five kilometers high, the total altitude would even be 48.7 kilometers. These figures prove how important air resistance is, and how much especially the first few miles of atmosphere decrease the speed of a rocket. It will be wise, therefore, to take off from the top of a high mountain.

Oberth has shown that a vertical take-off is not at all satisfactory if fuel expenditure is taken into consideration. If the Earth were an airless planet, one should take off at a very small angle, practically parallel to its surface. Since Earth has an atmosphere, one is forced

to travel the first ten or fifteen miles practically vertical in order to penetrate the densest layers of the atmosphere as quickly as possible. But then one can start to tilt the orbit of departure until it finally runs parallel with the surface of the planet, although far enough from it not to be handicapped by atmospheric friction. Professor Oberth carefully computed the optimal curve of ascent which gives the highest results at lowest cost and termed it the "curve of synergy."

Thus we have for the take-off a "curve of synergy," starting from the top of a high mountain. Is there still an advantage to be gained in choosing a special geographical location for this mountain, and in facing the curve of synergy in a certain direction? There is another gain possible; the speed of the Earth's rotation. If the curve of synergy faces toward east, the speed of Earth's rotation is with the ship and not against it as it would be if the curve faced west. And since the speed of rotation is highest at the equator—some 500 yards per second—the mountain should be located in the very midst of the tropical zone.

Strangely enough, there is actually a mountain in existence that fulfills most of the conditions for an ideal spaceport. It is Mt. Kenya in Central Africa, situated directly at the equator, more than three miles high, and surrounded by territory that would present no unsurmountable difficulties for the construction of several large airports. Since Mt. Kenya has generally gentle slopes, it would not even be difficult to build railways all the way from the airports near its foot to a possible spaceport on its top.

It would be strange if the first space-ships would take advantage of these opportunities and ascend from Mt. Kenya—the most modern product of civilization being launched from the very heart of the least civilized continent!

EVICTED BY ISOTHERM

by Malcolm Jameson

A new author shows that the weatherman isn't always wrong—and that he can be a bad man to argue with!

NEW YEAR'S EVE! Over the world people abandoned themselves to sheer joy at the release from the intolerable strain of the past two decades. For this was not the dying of a hateful year only, but of an unspeakably ghastly century—a century whose final years had been one awful crescendo of slaughter and destruction. Men and women crawled from their subterranean shelters and mingled gayly among the wreckage of their cities. In their hilarity they did not see, or pretended not to notice, the ineradicable lines of ingrained fear etched on every countenance. Fear generated and fed by the deluges of Feroxite bombs, of incinerating heat rays, of bromine clouds, and of the horrible neuronæmia germs.

For on this morning, the last day of the Twentieth Century, a lean, silvery cruiser of Panamericana, one of the few survivors of what had been an impressive fleet of many thousands, had dropped down on Teneriffe from the stratosphere to meet peacefully the squat, cup-shaped aerial flagship of the Eurasiatics, itself a remnant of a once fearsome horde. Even the grasping and ruthless rulers of Eurasiatica had recognized that unless this war was halted, there would be no human race to enjoy its victory. In spite of vastly greater numbers, they had been held to a costly draw by the Panamericans through the latter's adroit use of the miracles of applied science. The war was a stale-mate. For years now, it had been a suicidal deadlock—a stupidly continued mutual destruction

of peoples already ruined and exhausted. The armistice, bringing a pause in the useless carnage, was signed at high noon. By nightfall the world knew and rejoiced.

But not all gave themselves over to unthinking celebration. In an inner chamber of the North Regional administration building in the Idaho Rockies, the supreme directors of Panamericana affixed their ratification to the ten-year armistice proposal in gloomy silence. The Secretary had hardly left the chamber to broadcast the news to a jubilant hemisphere, when the Chief Commissioner gravely voiced the thought that was in every mind present.

"Ten years!" he said, slowly and distinctly, gripping the table's edge until his knuckles nearly burst their skins, "then the beginning of the end! Gentlemen, what we have negotiated is a breathing spell—the lull before the last act in the tragedy of our race. Do not deceive yourselves. There can be no peace with an organization dominated by the Neo-Aryans. In 1957 we signed a treaty guaranteeing to us the freedom of the Americas, for which we resigned all our other interests in the world. Yet four years later they attempted our conquest. Again, in '75, we made still other agreements. You all know how worthless those assurances were, and how useless our subsequent concessions. Even today, as they offer us this armistice, I learn that they are developing newer and more hideous weapons and that production has already begun in their for-

tress-laboratory in the mountains of Scandinavia. Their readiness for a truce is explained; they want these ten years to perfect their machines for one irresistible push. We must, whatever our preference, be ready to meet it. I tell you now, that when this armistice expires, we will be faced with but one choice—exterminate or be exterminated!"

Dr. Barnes, bearded and spectacled, the Coordinator of Sciences, arose.

"Gentlemen," he said quietly, "what the Chief Commissioner has just said is true. But it is true only so long as present conditions remain unaltered. It is within our power to alter them. I cannot agree that it is necessary to exterminate the Eurasiatics to secure a lasting peace. We need only destroy



Dr. Barnes looked toward the falling bomb. "That," he said sadly, "was a strategic blunder on their part, though they don't realize it. You can start the injectors. And—ah—predict colder, with snow."

the breeding place of the pernicious ideas of conquest. Let us, at one stroke, render Europe uninhabitable. Then we may hope to negotiate a real peace with the rest of mankind."

THE MEMBERS of the council sat looking at Dr. Barnes, puzzled at the unexpected speech. He continued, his eyes blazing as he warmed to his theme.

"As man to man, none of us has any quarrel with the European. You—I—all of us—are but transplanted Europeans. The European *outside of Europe* is not a predatory creature, not even quarrelsome. In the building of the old United States we saw millions of them of every Old World creed and nationality live and work peaceably together. Our race today is a blend of them. Yet all the while their cousins across the water were butchering each other on account of age-old prejudices. Every one of the important old-time capitals of Europe is haunted by the memory of a day when it almost ruled the world, and the ruler who sits in one of those thrones sooner or later acquires the obsession that he, too, is destined to control a great empire. My contention is that that evil heritage is local, not racial. We must deal with a ghost, not a people, a megalomania rising from the blood-soaked soil of a continent with *too much* tradition! I propose, gentlemen, that in the interest of all humanity, we make ready to force the abandonment of Europe!"

He sat down among the excited buzzing of the council. No more extraordinary view had ever been seriously stated before them. The Chief Commissioner was as astonished as any other member of the group. For many years he had been in more or less close association with the staid scientist and knew him to be indefatigable, resourceful, even brilliant, in his silent way. But tonight he had spoken with passion, and his arraignment of the inanimate continent

of Europe was as unexpected as his proposal to depopulate it. Yet, in other years, Dr. Barnes had offered programs that at the time seemed too fantastic for a sane man's consideration. Today, many of these were functioning as commonplace details of a highly technical civilization. The Chief thought best to approach this new idea with cautious open-mindedness. With a trace of irony in his voice, he spoke.

"Dr. Barnes, for the past many years your organization has been working day and night ostensibly to help us defend ourselves from these raiders from Europe. If you knew a way to render that continent uninhabitable at a single stroke, I deplore your reticence in keeping it a secret while we were wasting men and ships in futile and costly nibbling at it."

"Because," replied Dr. Barnes, with dignity, "time and equipment were not available. Such a stroke will require elaborate preparations. Furthermore, its consequences will be so grave that it should be invoked only by those madmen themselves. Now, we may prepare it secretly, as a purely defensive measure. If they keep the peace, it will not come into operation. But should they violate the treaties with a sudden, vicious raid—as they have done on every other previous occasion—that very act will set their doom in motion. The calamities that will thereafter befall them will be virtually self-inflicted. Our national conscience will be free of guilt."

These words gave promise of something more tangible. The Chief Commissioner cared little for any theory about the Europeans, but as a weary and experienced director of relentless warfare he saw here the promise of another weapon. If there could be such a one powerful enough to destroy a continent at a single operation, he wanted to know of it. That war was certain to be resumed, he had no doubt. This might be the deciding factor. He in-

vited Dr. Barnes to reveal the details of his plan.

The hearings required several days. Dr. Barnes successively introduced his two technical assistants in the plan, young Stanley, of the meteorological bureau, and Professor Stevens, the vulcanologist. It was Stanley's painstaking report that formed the basis for the discussions. The bulky portfolio, bulging with maps, was marked "Plan M-4", the only title by which it was afterward made known to the world. Eventually Henry Thatcher, Director of Construction, was called in for estimates and budget requirements. It was soon apparent that the figures involved were colossal and that ten years was hardly long enough for what was to be done.

The Chief Commissioner whistled when he examined the program. Besides all this, he must rebuild the sky fleets and rehabilitate the army. There were hundreds of ruined cities to be cleaned up and reconstructed. Combined, these activities would tax the mechanical and manufacturing resources of the hemisphere to the utmost. He felt that prudence required that the Eurasiatrics be met with the tried and proven old weapons as well as the new.

Yet this new idea appealed to him. It was breath-taking in its boldness and in its simplicity. But—would it work? A week of heated day and night session of the council brought the decision. It had to work. Nothing else promised more than a long, drawn-out continuance of the old struggle. Experience had taught them that the most hopeful end of that would be another truce of exhaustion. The project was authorized.

HENRY THATCHER stood on the summit of a low peak some thirty miles to the westward of Mt. Irazu, in the Cordillera de Salamanca, watching the action of two of his giant "moles" on the beach below him. The Caribbean, once ninety miles distant at this point,

now lapped the shore not five miles from where he was standing. The "moles" lay diagonally across the water's edge, like two stranded whales, half in, half out of the water.

The metal monsters, plated like armadillos, crawled imperceptibly toward the foot of the mountain. They were a matter of three or four miles apart, eating their way into the land that had once been Costa Rica. Each of them was five hundred feet in length and correspondingly thick. From its seaward side a huge suction hose dipped into the sea, on the other a massive tube of metal, more than fifty feet in diameter, led away over the land to the north. Following the tubes with his high-power glasses, Thatcher lost them in the haze of the distant horizon.

The crunch of approaching footsteps caused Thatcher to lower his glasses. Dr. Barnes and Stanley came up to him and exchanged greetings. He was expecting them, as they had notified him only a few days before that they were making one of their frequent inspection trips.

"How are the 'moles' behaving," asked Dr. Barnes, "since you started using the new solvent?"

"Great!" exclaimed Thatcher. "We've stepped them up from half a million cubic yards a day to almost two-thirds. The stuff is more fluid, too, than with plain sea-water. We are pushing the muck north now at a rate of twelve miles an hour through the discharge pipes. Next week we can cut out numbers 18 and 45 booster stations and send the men home."

The party turned their backs on the two grubbing dredges and a few steps took them to where they could see the Pacific Ocean. Here, the waves broke against the foot of the mountain. On this side the work was finished. Over to the southwest the watery horizon lay approximately where the shore line and some towns used to be. The formerly

distant Gulf of Nicoya was a thing of the past.

Thatcher pointed downward and a little to the right to a glistening outcropping of vitreous rock slanting down the mountainside.

"Ray-gun scar," he informed them, laconically. Dr. Barnes regarded the glassy run of congealed fused rock with a face set grimly. Here was another memento of some skirmish of the air. In this place, probably, a swooping Eurasiatic had overshot his prey and the dazzling lance had slashed against the inert peak below. Of all the areas, this isthmus, from Honduras to Colombia, had been the most incessantly ravaged by the invaders. Not one of the inhabitants of this region had survived the last war.

"What is your depth out there?" inquired Stanley, pointing at the Pacific.

"Fifteen hundred feet, minimum," replied Thatcher, "right in to the cliff. This range stands up pretty well for the most part and we can cut close. In some places there have been slides, but no big ones."

"That doesn't matter," said Dr. Barnes briefly. Then, "I see you are a few months ahead of your schedule. That's fine!"

"Yes," agreed Thatcher, "I always feel better a little ahead than behind. We are on the safe side with the Feroxite tunnels, too. All the shafts are down to depth, and about thirty per cent of the traverses finished. In another year we can commence boring out the big storage chambers."

DR. BARNES WAS well satisfied with the progress. In these seven years, Thatcher and the Panamerican construction crews had accomplished marvels. The clumsy "moles", in spite of their uncouth appearance, were uncannily efficient in their task of dredging away the lower flanks of the isthmus. This voracious implement, an invention of Thatch-

er's, softened bedrock by impregnating it with a solvent mixed in sea-water, then ground it to a paste within its vibrating interior. When fine enough, more water was added, and the resultant mixture was ejected into the waste tube that carried it hundreds of miles north to the dumping ground.

In each of the successive wars, the Eurasians had first of all struck at the canals of Panama and Nicaragua. When Thatcher had come to the isthmus after the armistice, he found two mangled ditches that must be cleaned out, straightened and rebuilt. This task was a trifling one compared to the larger order of Plan M-4, which called for the narrowing of the isthmus to leave nothing but the crooked backbone of the central range of the Cordillera. Thatcher was faced with the problem of removing all the shoulders and the plains from the northern canal, eastward to the eighty-second meridian, leaving in their place deep water. It was for this tremendous job that he had devised the "moles".

Twenty of them had been built and put to the relatively easy task of clearing away the Pacific side—easier, because there was less of it, and the removed earth could be spilled in the near-by deep water. There, the thousand-fathom curve was close to shore. But on the Caribbean side, Barnes and Stanley had ordered the earth conveyed far north to where the easternmost corner of Honduras made a cape. This forced the lengthening of the huge spill pipes and the interposition of a number of booster pumping stations. It was to have a look at the made land at the dump that led the inspecting party to leave its vantage point and go down the slope a few hundred yards to where their reconnaissance cruiser awaited them.

This machine was of the counter-gravity type, a thing of beauty in its delicate control, silent and smooth in op-

eration, and ideally adapted for hovering. As they soared away into the north, keeping low so that they could observe the encroachment of the scattered "moles" strung out along the shore line, Barnes sat in the rear compartment with his chief constructor and silently examined the terrain flowing by beneath. A long string of buildings on the mountainside soon came into view. That was a part of the "blind", supposed headquarters of the mythical *tromium* mines.

The government, itself a master at the art of espionage, had early, through planned indiscretions, permitted the misleading news to leak out that the soil of the isthmus was rich in *tromium* ore. Since then, the director of the spy-defense section had gained some amusement and not a little profit by seizing a number of Eurasian agents trying to burglarize laboratories to secure specimens of the metal. There actually was no such metal, but the imaginary properties ascribed to it were so marvellous that it served nicely to explain the magnitude of the mining operations in Central America. The Fleet Command had cooperated nicely with some wishful thinking in "discovering" *tromium*. Its "properties" were a nice combination of all the things they wanted and didn't have.

Dr. Barnes noticed, on a flat landing platform beyond the buildings, the spread wings of three old VSF-6 machines, glistening under a new coat of silveroid. He pointed at them in surprise, as the type had been obsolete for many years.

"Bait!" explained Thatcher, grinning.

Dr. Barnes bristled slightly at the other man's frivolous attitude toward so grim a matter. Himself a lofty idealist, he scrupulously refrained from allowing his emotions to become involved, even if, as now, he was planning the banishment of an entire race from its homeland in the greater interest of all men. He remarked, a trifle coldly, "You seem

to enjoy your work, Mr. Thatcher!"

"You bet I do!" replied his companion, but the smile had vanished. "My mother, wife, and the three youngest children were in the so-called 'respected zone'. It was neuronemia they dropped there, if you recall. That was the time we first heard of it. And my son Charles was in charge of your Thermo-dynamics laboratory the night——"

"I am sorry," said Dr. Barnes, soberly. "I keep forgetting."

LITTLE ELSE was said for the rest of the trip north. Above the Rio San Juan they passed over miles of warehouses where the Feroxite was being accumulated. The tens of thousands of tons to be required during the last year was too stupendous a shipment to cope with in a single year. These planners, with their customary forethought, had commenced the accumulation of it early. Now there were considerable stores of it at both ends of the cuts.

At the point where Cape Gracias a Dios had stood for centuries among the shoals and pinnacles of the western Caribbean, they now could see the landward end of a slender peninsula stretching away to the east-northeast. Eight of the big spill pipes ran along it, side by side. Through them rumbled the soupy mixture of ground-up isthmian bedrock. On past where Gorda Bank with its skeletons of ancient galleons had lain, even to Rosalind Bank, the fat tubes went, and then curved out of sight into the water.

"There are no more shoals; this will be all the dry land we can make," said Thatcher, gesturing toward the tip of the peninsula where the pipes plunged into the sea. "The muck is now being spread over the bottom between here and Jamaica. We cannot avoid some loss, as the current is raking part of it into Bartlett Deep. But if my estimate of the amount we still have to move is correct, we should be able to shoal this

passage to somewhat less than a hundred fathoms."

Stanley was in the center compartment, feeding charts marked with odd-shaped punch holes through an integrating volumometer. Stepping to the auxiliary on the side, he cranked in gradient, friction and viscosity factors. He read off the answer from the annunciator dial.

"There is nearly enough now," he called back, "but let it run. The bigger the factor of safety, the better."

The next evening the party rested in the living room of Professor Stevens' bungalow, high up above St. Pierre. They had spent the day looking over the control panel of the valve room of one of the radial injectors of Mt. Pelée. Dr. Barnes complimented Stevens on his ingenuity and tenacity in the highly hazardous and unprecedented assignment he had been given.

Never before in history had men deliberately sought to prime a volcano. Nor were they ready yet to do so, for first the delicate work of sinking a dozen shafts leading downward and inward to the hot explosive core had to be done. The problem was to drive them deep enough—but not *too* deep. These shafts were spaced more or less evenly on a rough circle about the base of the mountain. Water suction pipes of large diameter were brought up from the sea and connected to monstrous centrifugal pumps, radio-powered and wired for remote control.

Professor Stevens had supervised the work faithfully these anxious seven years and had now completed the underground work without serious mishap. There was yet much to do, as only one of the pump units had been installed. Pelée on Martinique and Soufrière on St. Vincent's were the two volcanoes he had drilled. Like the isthmus, these islands had been depopulated by the Eurasiatrics, their cities erased. Their further wreckage would entail little loss to the world.

Stanley's Plan M-4 called for a major volcanic eruption, to be set off at the exact moment desired. Dr. Barnes, in approving the plan, thought it best to rig two volcanoes, in view of the uncertainty of control. If one refused to erupt, after being primed, there at least would be another one ready for the attempt. The volcanic explosion was not a vital part of the plan, but a highly desirable accessory, because of its accelerating effect.

They discussed a number of aspects of vulcanism that night, and it was quite late before they were ready to retire.

"You understand, Stevens," cautioned Dr. Barnes, "that an ordinary eruption will be just a waste of time. We must have a really tremendous explosion—something on the order of Krakatoa, or of Asamayama in the eighteenth century. Violence to the utmost! Nothing less will do. Are you ready to say you can produce it?"

Professor Stevens shrugged his shoulders and spread his hands in a gesture of helplessness.

"I am not prepared to guarantee anything. Maybe these mountains will blow up. Maybe not. I would like to push the injectors lower, but I don't dare. One might backfire, which would wipe us out, a thing I do not care for. But worse than that, it would bring on a premature eruption that might 'kill' the mountain for years.

"However, from what I have learned about the rock structure under here, I am inclined to think these fellows will explode within a week after we start the water down. As to the quality of the explosion, no prediction about what a volcano will do or will not do is worth the breath it takes to make it."

Dr. Barnes laughed and suggested they go to bed. After all, if Stevens didn't know, nobody did.

THE FOLLOWING year, 2008, the ambassadors of both the major divisions

of the human race set their signatures and the Great Seals on a treaty of perpetual peace, each promising faithfully never again to encroach upon the other's hemisphere.

People of good-will hoped that the treaty would mean something, that the Eurasiatrics would respect it. But, nevertheless, persistent and ominous rumors kept coming of gigantic offensive operations being perfected. Confidential reports from Panamerican agents in Europe brought confirmation. Travel of any sort was forbidden through certain areas, most especially the Scandinavian peninsula, and the great industrial tract formerly known as Poland. The unknown factor was the date, the day when the inevitable surprise attack would be sprung.

Two years later, Panamericana had finished its defensive program, as originally scheduled. Its stratosphere fleets had been rebuilt, the army in readiness. A reserve was at hand with which to hold back the Eurasiatrics until the strange new weapon of Dr. Barnes was brought into play. There was neither desire nor intention of using these forces offensively; instead there was the solemn hope that they would never have to be used at all. But the Chief Commissioner was none too easy about the security of the nation. It could well be that the enemy had also invented some new, unguessable weapon. He could only wait, for to the cynical mind the last treaty was as meaningless as any that had gone before.

On the isthmus, all construction machines and crews had been removed. There were only skeleton forces residing at the two oceanic canals. Between them, the slender thread of the single range of the Cordillera was all that remained of the isthmus. These mountains were permeated by a system of inter-connecting tunnels, with risers to appropriate places near the summits, and throughout were numerous large cham-

bers. This network was packed with Feroxite in all its ramifications. Many of the explosion chambers were located far below sea-level.

At Trinidad, Professor Stevens was living in a bomb-proofed powerhouse, guarding his generators and the projectors of the radio power by which the great pumps of his encircling volcano injectors were to be operated. In the same tight building were the controls to actuate the valves of the injectors and to start the robot machines. He remained there quietly, making occasional tests. From time to time he would tour the two deserted islands and check the state of his equipment.

Quite by chance, in June of that year, Tomboro, a great mountain in Sumbawa, blew up with frightful abruptness in the greatest eruption in history. Within three days, the earth was treated to the spectacle of gorgeous sunsets everywhere. The sun, when it could be seen, was always ringed by an extensive reddish corona--the "Bishop's Rings" of the meteorologists. Stratosphere pilots complained of the haze and low visibility at all altitudes. Volcanic dust filled the upper air, all over the earth.

Stanley, taking advantage of this purely natural disturbance, had warnings broadcast to all portions of Panamericana. Local administrators were advised to take steps to provide against an approaching winter of extraordinary bitterness. The Chief Commissioner had certain exposed areas in Canada, Patagonia and southern Chile evacuated. Everywhere, fuel in extra quantities was made ready and stored.

The high council received warning in October that the Eurasiatic breach of the treaties might come at any moment. Heretofore, most aggressor nations had chosen the spring as the time to launch wars, but in this instance the effect desired was surprise. The crafty rulers of Europe hoped that summer being past, the Panamericans would be less alert.

In three great divisions they came across the Atlantic, one in the far south, one in the north, and the central one to occupy the Caribbean area to sever communications between the two Americas. Both in the south and the north, equally great fleets rose up to meet them. The old, old, meaningless round of slaughter and destruction, of merciless killing and burning—purposeless, because the two combatants were so exactly balanced in power that half a century of previous fighting had brought no result but universal exhaustion.

The central squadron, acting along its traditional line of attack, advanced straight to the Isthmus of Panama, bombing and sweeping with heat rays as it went. At Panama, part of the aerial destroyers stayed to complete the destruction of the force there, while the rest went on toward the Nicaraguan ditch. In time, they saw beneath them the houses built by Thatcher, the buildings they believed to be the celebrated *tronium* mines. The attacking vultures swooped lower, dropping their bombs as their sights came to bear.

WITH A BLINDING blast that made every seismograph in the world dance spasmodically, the Cordillera de Salamanca flew instantly into fine dust, rising miles high in the geyser of seawater that went up with it. The bombing squadron above them, men and machines in fragments, went too. Even away to the east, above Panama, the other invading bombers were hurled sidelong through the air like chips in a typhoon, crashing into one another, exploding from the contacts of their own deadly loads, and scattered as crumpled wreckage far beyond into the agitated waters of the Gulf of Darien, or into northern Colombia.

There was no living thing for hundreds of miles around after the explosion of the gigantic mine of Feroxite. Where the Cordillera had been was now

a gap in the isthmus two hundred miles long. Through it rushed the waters of the Caribbean, pouring to the west into the Pacific. Under water, the ragged stumps on which the mountain range had stood were being gnawed at and smoothed away by the steadily increasing current. The great Atlantic Equatorial current had found a gate to the west! No longer was it pent within the blind alley of the Caribbean and forced to escape through the Yucatan Channel to the Gulf of Mexico, where in turn it had no outlet but to double back and flow into the North Atlantic. The reason for the existence of those currents was gone. Straight ahead lay the best route.

In Trinidad, Professor Stevens heard the tremendous explosion. He needed no other signal. He closed his switches. The injectors to the roots of the Antillian mountains obeyed their robot valves and began feeding tons of seawater into the hot sub-crater crevices. In a few hours one, then the other, of the terrible volcanoes went into action with roars that made the vast Feroxite blast inconspicuous. Soufrière and Pelée had belched another cubic mile of dust into the high isothermal zone of the stratosphere.

Dr. Barnes and Meteorologist Stanley were waiting in Yucatan. Directing the same craft in which they had made their inspection tours, Barnes slid out of the prepared hide-out and hastened to view their handiwork. As they flew over the watery wastes where ten years before Costa Rica had lain, they were satisfied. The cut was clean. Only one small island marred the completeness of the blast. Not until systematic surveys could be taken would they know the full measure of their success, but they saw enough to give them confidence that their plan had been proved.

"Let them fight a little while, over the cities," said Dr. Barnes, with an air of finality, as he thoughtfully stroked his



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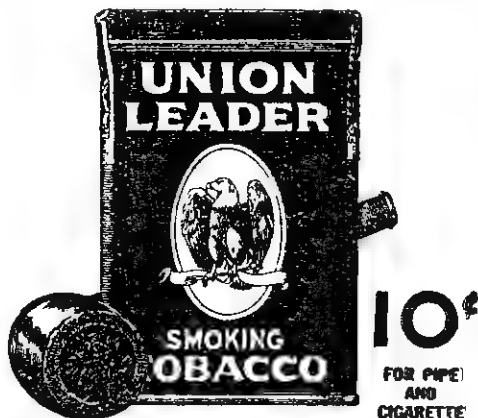
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THE GREAT AMERICAN SMOKE



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beard. "It is already November. Soon they will quit coming; they will be having too much trouble at home."

IT WAS A terrible winter everywhere. The cold waves came early, stayed longer, and were more intense. The sun, veiled by the dusty stratosphere, gave little heat, except within the tropics. By December, sub-zero weather was being experienced throughout the country north of the Chesapeake.

The Eurasiatics, discouraged over the utter loss of the central contingent that had perished over the isthmus, and baffled by the unexpected stiffness of the resistance, were in growing difficulties. The stratosphere was too hazy for high altitude work and the winds steadily increased in violence. Their position in the hostile skies quickly became untenable. Reluctantly, they withdrew and returned to Europe.

But there they found conditions far worse. Blizzard had piled on top of blizzard. North of the Alps, every valley was already filled with snow drifts. The Baltic soon froze and took on the appearance of the Arctic Ocean. The great base they had established in the Kjolen Mountains, filled with war supplies and the devilish cultures and chemicals for the last world struggle, became inaccessible. Unprepared for cold so bitter and so prolonged, the inhabitants, already bled of their vital reserves in the assembly of materials for the big push, suffered intensely. Soon they began to die in increasing numbers as they struggled desperately through the drifts and the icy blasts seeking the warmer south.

In the Americas it was somewhat colder than usual, but thanks to the warnings and careful preparations of their government, there was little real suffering. The country dug in and made the best of a hard winter. A close watch was kept on the skies, but the invaders did not return.

There was good reason for it. When March had ended, the North Sea was as frozen as the Baltic, and the shivering refugees from Britain crossed the Channel on sleds. Weather stations—before they were abandoned—reported that the Iceland "low", that beneficent guardian of Europe's climate, had first moved away toward Labrador, and had then dissipated. Mean temperatures had already dropped twenty degrees. The isotherms, those sinuous lines of equal temperature, which had heretofore crossed southern Canada only to curve far to the north on crossing the Atlantic, were rigidly straightening out. Like creatures caught in the bight of a wire being drawn taut, the peoples of Europe were relentlessly being shoved out of their homelands.

Some stayed, tearing down the houses of frozen or fleeing neighbors for fuel. Spring would soon come and the hard winter would be gone. But spring did not come. Nor summer. The myriad tons—cubic miles—of volcanic dust in the high heavens intensified all woes by filtering out a large proportion of the incoming sunlight. The plains and mountains below, dazzling in the unbroken cover of snowy ice, reflected completely what little heat reached them. A new winter came, or rather, the year-old one became more dark and tempestuous. Other layers of ice and snow were laid above those already there. A new Ice Age had begun—a glaciation invited by the impetuous commander who had set off the blast that killed the Gulf Stream.

The Director of the Eurasiatics had shifted his capital successively to the south until now it was in Jerusalem. It was a strange Holy Land, a white waste of snow, but not so bitterly swept by the howling north winds as the continent left behind. It was here that he was to receive the full impact of the consequences of his ill-advised ambition to rule the Earth.

REPORTS from all sections of Europe were more and more disconcerting. Copenhagen, London, Berlin—all these had been wholly abandoned, cluttered with ice and snow to the second stories of the buildings. The circulation of the winds had drastically changed. The prevailing ones were now from the north, and as the flow of heat formerly conducted by the Gulf Stream from equatorial regions to the Arctic was checked, the temperature gradient between the two zones steepened. Wind velocities were at hurricane heights.

Krevinsky, the chief meteorologist, who heretofore had been offering weak explanations, mouthing such phrases as "sunspot cycles," "solar constants," and the like, now knew that the great ocean current had actually been diverted. England was to become another Labrador, Scandinavia an eastern counterpart of Greenland. But what puzzled Krevinsky was the suddenness of the glaciation. Such a profound change could hardly come so quickly.

While he was pondering this enigma, further dismay was created in Jerusalem by the receipt of a curt notice from Hang-Chow, regional capital of the Oriental division, that the yellow race had asserted its independence of the Eurasiatic confederation. More and more in recent years they had come under the domination of the pacifistic Chinese. Asia now, as well as ice-bound Europe, was lost to the grasping dictator.

Zandorff, the director, recognizing his temporary inability to do anything but accept the secession, turned his attention once more to the situation in Europe. There had been other severe winters; this one would pass. He sent for Krevinsky, and demanded sternly for a long range forecast. He wanted to know *when* the government could move back to Vienna.

But by that time Krevinsky had learned of the two volcanic eruptions almost coincident with the great blast at

the isthmus. Previously, his technicians had interpreted the recorded tremors as indicative of the delayed portions of the isthmian blast. Now he knew the worst.

"Excellency," he said, "hereafter the winters of Europe will all be cold. The Gulf Stream has ceased, and with it the Iceland 'low'. If that were all, the continent would be uncomfortable, but much of it habitable. But in addition to that, we will have no summers, and far more severe winters, until the dust of three tremendous volcanic eruptions settles. That condition prevails over the whole world."

"Why should that make a difference?" snapped Zandorff, impatiently. "Why are *we* worse off?"

"Because it starts the vicious circle of glaciation. The dust, being fine, scatters and disperses sunlight—but does not interfere with the outgoing terrestrial radiation of long wave length. We will lose much more heat than we will get for the next several years.

"The ground is already frozen deep and there are many feet of ice. Once the continent is deeply covered by a white, reflecting surface which cannot all melt in a summer, the solar heat will be merely rejected by the snow, and not absorbed. Every successive winter thereafter will add to the thickness of the ice.

"Excellency, until a great natural upheaval re-routes the ocean currents—we must abandon Europe to the glaciers."

Zandorff snarled in rage. He ordered his guards to drag Krevinsky away. "Execute the incompetent fool!" he screamed.

But the enormity of the folly of the last expedition had been realized at last by the long-suffering Europeans. Instead, they imprisoned Zandorff, pending his execution for high treason.

The council reconvened and sadly took up consideration of the project to emigrate into Africa and try to build a new nation among the colonies there.

The Disinherited

*A short story about one who watches
over development.*

by Henry Kuttner



*The giant spoke.
"You are safe here.
Your enemies can-
not pass that bar-
rier."*

THE man worked swiftly and mechanically, a grotesque figure in his protective armor and transparent helmet. He was alone in the bare lead-sheathed room, seated before a conveyer belt, his gloved fingers making delicate adjustments in the enigmatic mechanisms that moved into place

under the microscope before him. There was a stinging smart in his eyes, a dull pain he would not be able to relieve until his work was done.

Fifteen years ago a soldier had taken him to this grim chamber far underground and instructed him in his duties. Ever since then he had known the dull

monotony of a machine's existence, not even comprehending the nature of his work. In 2530 A. D. the Helots—the worker class—had lost all knowledge of science, and so the man could not understand that the subtly powerful bombardment of radium was destroying his sight and his life. But the horror of darkness that lay before him he realized, for his father, too, had worked in a room similar to this.

Presently a bell sounded through the audiophone within his helmet, and the man arose as the conveyer belt slowed and stopped. Sighing, he removed the armor. Under the cool radiance of carbon-dioxide lamps he stood revealed as a thick-bodied youth whose seamed, harsh face seemed far older than his twenty-eight years. A loose, sleeveless tunic, shorts, and sandals, were all the clothing necessary in the warm atmosphere within the City of the Lords. He stepped out into a low-ceilinged corridor and trudged toward an elevator.

Five minutes later he thrust open the door of his apartment, a cheerless room in the Helots' dormitory section. With no trace of expression on his stolid face he crossed to a low couch and dropped upon it in the utter relaxation of weariness. But he sat up quickly as a girl entered.

She, too, wore the sexless Helot uniform. Her face and close-clipped dark hair seemed drab and uninteresting, but the mask of impassivity dropped from it as she came toward the man, and made it alive and attractive.

"You're tired, Ron," she said. "A hard day?"

Ron Carver shrugged. "I'm strong enough for it, I guess. But my eyes ache——"

The girl went to a compartment in the wall and brought out a vial. She pressed Carver back on the couch and brushed his eyes with the soothing liquid as she talked.

"Must it go on forever?" Her voice

was very bitter. "Won't they transfer you?"

"Why should they, Morna? It's easy to get new Helots to replace the others." He sat up again, gripping her wrists. "Morna, I had another warning today. About——"

"A—a child?"

"Yes. We've been mated for a year now, and—well, you know their laws. So many Helots annually—no more, no less. They want——"

Morna dropped the vial unnoticed on the floor and stared dully at nothing. "No. I won't bear a child. Not even your child, Ron—to this. Slavery. No!"

WITHOUT expression Carver said, "The alternative is a re-mating. Some other Helot will have you."

"No," the girl said again. "We can die if necessary."

"You know I can't. There's Ardno out there——"

Morna held up a warning hand, her face frightened. The girl's lips formed unspoken words. "Not here. *They* may be listening."

She picked up the vial and resumed her task of bathing Carver's eyes. "They've been talking in the Factory, Ron. Excitement—all through the City. About the Ship."

"Eh? I heard something, not much though. Has it reached Mars?"

Morna shook her head. "I don't think so. A few rumors floating about, that's all. Nothing's certain. They wouldn't tell *us*, you know. But I believe something's gone wrong. One of the guards told a girl that the Ship stopped halfway to Mars and is coming back. It's strange."

"Why strange? They might have run out of fuel. Or——"

"It's more than that," Morna whispered, her mouth close to Carver's ear. "I hear the Lords are—afraid!"

"What?"

"Something happened out there in

space. I don't know. It's the first interplanetary flight beyond the Moon, and—— Don't keep moving, Ron! I can't——"

But Carver pushed her away and got up. He went to a closet and from behind a meagre stack of garments withdrew a small parcel, which he hid in a mesh-steel knapsack. He donned heavier clothing.

"Be back soon, Morna," he told the girl, and went out.

Morna stared after his bulky figure. Her hands were clenched in her lap, still gripping the little vial. Presently she dropped it to the floor and crushed it underfoot, grinding the glass to splinters. She was thinking of the warning Carver had received. Another mate. No! She would bear a child for only one man, and not even for Carver would she bear—a Helot. Another slave for the machines of the Lords!

CARVER made his way to one of the City's gates. His pass was in order, and the soldier nodded and waved him on. A long, broad road stretched into the blue distance through wooded hills, but Carver turned aside into the scanty forest. Occasionally he cast a furtive glance behind him, but, though autocars flashed along the road and one or two aircraft droned overhead toward the landing-fields on the City's roof, no one paid heed to the Helot. It was good psychology to let the workers do as they wished during their free hours. Always provided that they did not interfere with the pleasure of the Lords.

Outside the City the wind was cold and chilling, yet Carver drank it in hungrily, his face bare to the refreshing blasts. Out here a man could feel some illusion of a freedom which had not really existed in America, or in all the world, for hundreds of years. To be free one must have in his veins the untainted blood of the Lords, the racial purity that gave them license to rule

Earth. Other races were inferior by law of conquest and by decree of the Lords, who held their power over the mixed stocks of America, as ages ago Americans had enslaved the Negroes. The guards were recruited from the ranks of the Lords, each youth serving a brief military apprenticeship. And under the oligarchy sweated and labored the Helots, their birth-rate limited, hopeless and impotent, their criminals doomed to being hunted down by wolfhounds for the sport of the despots.

Carver could not understand the social forces that had inevitably led to such an end; he simply toiled and hated, one of a million robots working amid the slim, graceful forms of the overbred Lords. Now he trudged through the forest, the ground strange to his sandaled feet which were more used to the rubbery pavements of the City corridors. Once he glanced up at an unfamiliar shrilling in the air, and saw a gigantic silvery torpedolike craft drift down till it was hidden by a wooded bridge. The Ship, returning from its voyage toward Mars. Briefly he wondered what had gone wrong in space.

BUT THE SHIP was forgotten as he came to a little cave beside a brook, and saw an old man, gnarled and shrunkened, sitting in the sunlight. Carver came forward hastily.

"Ardno," he said. "Father. You should not—what if they saw you?"

The oldster turned a sightless face, pale and wrinkled, toward Carver. His voice was thin and high.

"I'd die, of course. They'd kill me. And you'd not have to risk your life smuggling food out of the City to me."

Carver's quick glance examined the sky. He helped his father into the cave. For almost a year Ardno Carver had dwelt here, since his failing sight had brought down on him the official decree of euthanasia. There was no room in the City for outworn Helots. Death was

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painless and merciful. But to young Carver it had seemed very horrible that his father should die, and so he had managed to do the impossible—guide Ardno to this lonely place where the blind man could still live, after a fashion, feeding on the scraps Carver stole.

"Well?" The oldster's voice was querulous. "What did you bring, eh?"

He was not satisfied till he had fingered each morsel and lifted it in misshapen fingers to his nostrils. "It'll do," he said grudgingly. "It'll have to." And he fell silent, cramming the food into his mouth.

Carver sat in silence on a boulder, eying his father in the gloom. He remembered when Ardno had been a strong, well-shaped man who had more than once felt the lash because of his moments of insane defiance. A bitter, dry sob shook Carver's thick body. The father looked up quickly, a crumb of bread on his lip.

"What's the matter?"

"Nothing."

Sightless eyes stared in Carver's direction. But after a moment Ardno returned to his meal.

THE NEXT DAY there were whispers in the City. The Ship had returned. And the crew were frightened and puzzled. Something had stopped them in space—some force they could not understand. They had returned to Earth, but not under their own power, unable to comprehend what had happened to them.

So much the tales said, furtively murmured among the Helots. There was a curious air of unrest in the City when Carver slipped out that night, and, walking swiftly along the road in the twilight, unaccustomed thoughts stirred in his mind. Apparently the Lords were not omnipotent. They could be defeated. But—Carver smiled bitterly—not by Helots. Not by unarmed slaves.

Abruptly he stiffened. A familiar

figure was coming toward him, vague in the distance. With a cold shock he recognized his father, and saw that two men—guards!—were moving swiftly in Ardno's direction. Blindly the old man walked, gnarled hands outstretched fumblingly, his feet guided by the hard surface of the road.

"No!" Carver tried to shout. "Go back! Back!"

Somehow he knew why Ardno was here. The old man had come to find death that would release himself and his son from an existence that had grown intolerable. No longer would Carver need to risk torture by smuggling food to his father. And, for Ardno, blindness and agony would be over. As Carver raced on, a part of his brain was saying, over and over, "This is best. It's the best way out."

The affair was finished before Carver reached the group. Ardno was quite dead, a limp, misshapen huddle beside the road, and the two guards were sheathing their guns. One of the soldiers turned to face him.

"Well? What d'you want, Helot?"

Ever after that Carver was to remember how the sinking sun glowed redly behind the two men, outlining their slim figures with a hazy aura. And he remembered, too, the silhouette of an arm coming up, a gun gripped in a slender hand. Strangely he felt no emotion; he seemed to be outside his body, watching it dispassionately, listening to its hoarse breathing.

"Well?"

If he said the wrong thing—if he revealed his relationship to Ardno—it would mean perhaps death, at least torture. Carver hesitated. His great shoulders shook as he fought for air, through a throat dry and clamped.

One of the guards said something in an undertone. The other nodded, moved forward, his weapon's muzzle not a foot from Carver's chest.

"Helot—back to the City! At once!"

Carver shrank away, looking down at the gun. And beyond it he saw, almost at his feet, the blind staring eyes of Ardnó.

The Helot, Carver roared—and the powerful engine that was his body swept into action. One huge hand drove down, clasped the gun and wrenched it free. He scarcely heard the report or felt the bullet tear along his palm. He saw nothing but the startled white face of the guard, and beyond it the other man drawing his weapon.

"He's mad!" the disarmed soldier cried, and screamed in agony as the gun's butt smashed into his face, pulp- ing its delicate features in bloody ruin. He staggered away, still shrieking, and Carver lunged at the other man.

A bullet hit the Helot's side and glanced off his ribs. But that could not stop Carver. Without glancing at the bellowing gun he came forward like the drive of a piston, and his fist cracked cleanly against the soldier's chin. The man went back bonelessly and dropped, his head twisted at an impossible angle.

THE OTHER GUARD lay limp and unconscious. Breathing harshly, Carver stared around. Cars were approaching. The Helot's side hurt. He touched it, and was surprised by the amount of blood that smeared his hand.

Insensate rage mounted within Carver, and he stood with his fists clenched, facing the City. This will mean death, he thought.

And a new mate for Morna——

The realization stabbed his brain. His lips moved wordlessly. He turned and ran toward the forest, and behind him came a fusillade of shots.

From the woods a man came to meet him—such a man as he had never seen before. Ten feet high, moving with lithe, unhurried swiftness, he was at Carver's side before the Helot had covered three yards. Carver growled an oath, lunged at this new enemy, teeth

bared in a snarl.

And without warning came—the inexplicable. Around the two there lifted a wall of cold flame, crackling softly as it grew and came together fifteen feet above the ground to form a dome. They stood within a little hut of fire, spring- ing apparently from the Earth itself.

Fear shook Carver. But in the new- comer he saw only menace, and he leaped forward——

And halted. Some incredible force held him motionless, draining his mus- cles of power, holding him paralyzed. He stood fighting against invisible bonds, glaring at the other.

It was utterly silent, save for the faint crackling of the flame-wall. Against the pale glow loomed the gi- gantic figure, and now Carver realized that he was not looking upon a human being.

For this man was cast in human mold, yet about him was an air of alienage—a calm and passionless withdrawal in the pale eyes—that told more than did his abnormal height. He wore a scanty, sleeveless robe, and his muscles beneath ivory skin were those of a colossus. Somehow the fear and hatred in Car- ver's mind faded and fled away as he looked into the wise, ancient eyes of the giant and read in them a message.

He did not hear it, but words seemed to form within his brain, unmistakable as though spoken by an audible voice. It said softly, "I will not harm you."

From the dome of fire above, a flam- ing tendril dropped straight for Carver's head. It touched his hair, seemed to probe through skull and brain, an ut- terly incredible search that found the secret citadel of the man's being and— examined! To Carver it was as though he lay naked before the eyes of a god. He sensed some incredible communion, a flood of knowledge pouring from him into—what?

The sensation vanished. The finger of light was gone. The giant put a

huge, yet somehow graceful hand on Carver's shoulder. Once more a wordless thought came to the Helot.

"You are safe here. Your enemies cannot break through the barrier."

CARVER KNEW that he should have been frightened, yet he felt only a vast and utterly new sense of peace. The gray eyes of the giant aroused in him a sensation he could not analyze. He seemed to look through them into another world.

The huge man seemed to listen. He bowed his head in acknowledgment. To Carver he said, or seemed to say, "Hearken, for you must remember this. Your masters—they who call themselves Lords—have sent out a craft beyond the atmosphere of this world. And therefore they have brought themselves within the ken of the Watcher."

Carver whispered, "The—Watcher?"

"Aye. A being evolved from Man, but so alien to us that we can comprehend little of his attributes. From a dead Galaxy he came, to guard this Galaxy of ours. For Man is born to serve—but to serve those beneath him, not those above. Far in the future, life in this Galaxy will have evolved to a state where it is sheer energy—a super-intelligence composed of all the beings from all the planets in this star-cluster. From a single cell we go upward, till at last we become as the Watcher—a being of energy, of life itself. And when that time comes, we shall leave our dead group of worlds to find another Galaxy struggling up evolution's path, and we shall guard and guide it as the Watcher guides and guards us. For ages we of Mars have known the Watcher and communed with him. He prevented us, in our days of savagery, from bringing war to the other planets—as he shall do again now."

The walls of flame brightened, casting a white glow over the Martian.

"The Lords rule your world, and rule

it unwisely. In time they might learn wisdom, but they must not bring the seeds of folly and war to the other planets. So the Watcher turned back their spaceship and brought me here from Mars to aid him. He—and I—have learned much from the minds of your people. You are the last of fifty we have examined, and the Watcher has decided on the best course."

Carver could not entirely understand, yet a surge of hope mounted in him. "You'll help us kill the Lords?"

Ageless sorrow stood for a moment in the Martian's pale eyes. "No. You are yet barbarians. You have a long road to travel. But in your group—you Helots—there are the germs of courage and strength and truth. So, for a hundred years, all power will be taken from the Earth."

"I don't understand——"

"You cannot. Science has been lost to you for ages. Yet there are dreamers among you, and after the hundred years have expired, you will rediscover the wisdom of your ancestors. Use it; do not misuse it. The Watcher has power over vibration and over energy—you cannot understand that, but know this: the Lords are hereafter weaponless. Their guns are toys. Their great machines will halt for lack of fuel. If they continue to rule the Helots, they must do so by brawn or brain alone—and they cannot succeed in that. From this hour you are equal to the Lords."

A mad little flame of vengeance grew and danced in Carver's eyes. The Martian lifted his hand.

"Wait. You must not begin your task with evil. Seek no revenge on those who were your masters. Leave them; they cannot halt you. Go forth into the fields and forests beyond the cities; learn to live as free men. Learn to till crops and kindle fires. Grow wise. And in a hundred years Earth will have power again."

Carver whispered, "The Lords——"

"They must learn to live, and forget how to rule. Else they will starve in their giant cities. Now wait: with the Watcher's aid I shall speak to the Helots all over your planet. Wait——"

CARVER SENSED a strange tenseness in the air, as though it shook under the burden of power inconceivable. Through the man's mind came a thought, and he knew, with a curious certainty, that the same thought came at the same time to the brain of every Helot in the world.

"Come forth from your cities! The Lords are powerless; their rule is broken. Harm no one—but come forth! You are free henceforward!"

The Martian looked down at Carver. His smile was very tender as he placed his hands on the Helot's shoulders.

"You must lead your people now, and give them the Watcher's message. So farewell—brother!"

A blaze of light blinded Carver. He staggered back, rubbing his eyes. When he could see again, he stood alone on the sloping hillside. Martian and walls of flame had alike vanished. Though the Sun had set, a full Moon washed the bulwark of the City, half a mile away, in gleaming brilliance.

A knot of men stood in a puzzled group beside the road, staring toward Carver. Beyond them were several autocars. And further down the road

Carver could see other vehicles coasting to a halt.

At this time, he knew, the City should be bright with innumerable carbon-dioxide lamps. Yet its windows were dark. From far away came a faint triumphant shouting.

A few soldiers separated from the others and came toward Carver hesitantly, their guns leveled. He went to meet them, and briefly felt a surge of hatred that dried his throat with its intensity. But he fought it down, as he fought down the momentary fear that arose at sight of their weapons.

The guards squeezed triggers—vainly. They stood undecided finally forming a barrier, shoulder to shoulder, against the advancing Helot.

Without perceptible effort he pushed them aside. They were weaklings, he thought contemptuously. And, strangely, all hatred of the Lords had left him. Before him lay a mighty task, and he could not halt now to destroy those who had been his masters.

The Lords stood staring after him as he swung along the road, a tall defiant figure in the moonlight. From the gates of the City a horde was pouring, men and women who had been Helots—slaves no longer! Among them, Carver knew, was Morna, Morna who would bear his child. Still the mob pressed forward, shouting.

Carver went down to meet his people.

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"Hell Ship"—first of the spider-fleet.

Dear Mr. Campbell:

Have I got a new idea for space travel in "Hell Ship" or haven't I? It seems like it to me, and *Arachne*, the *S. S. Arachne*, if you please (with *S. S.* standing for "space ship")—is a real vessel to her papa. I could even draw a picture of her which might be tough with most any other of my science fiction machines.

The idea came to me at one of those demonstrations performed with a saltshaker, a magnet, a piece of paper, and a liberal supply of iron filings. Take the magnet, cover with the paper, load the saltshaker with the iron chips, and sprinkle. The filings stand up bravely and show you patterns and lines, "lines of magnetic force." They showed me a way to a new story, and a new ship, anyhow. They're invisible, those lines, but real, though you can't see them as steel cables. They'll replace steel cables, hitching the lift of a crane to the mass of steel that needs moving. They'll harness a half-million horsepower steam turbine, hold it down and make it work, and turn out electric power.

They're real, and you can take hold of them—yet you can't feel 'em. You can't, that is, unless you got the right kind of apparatus. A simple electrical coil will take hold of them. A simple coil of wire with a simple current flowing through it will take hold of those invisible, "intangible" lines of force and shinny up them like a monkey up a vine.

Or, like a spider up a thread. So, it's the *Arachne* of course. Einstein's shown that electric, magnetic and gravitational fields are similar in character. Electric and magnetic lines of force are used, worked with, handled regularly, today. Well, when we get to know a little more about it, maybe we can design the right kind of coil, and send the right kind of current through it, and have a device that will climb up and down the gravitic lines of force as readily as the simple coil with its simple current will slide up and down the magnetic lines of force.

The ship built up about that as it would on the drafting boards of the Caperton Company. First, the coil, spun in the lines of gravitic force to generate the peculiar currents needed, and the great shaft to drive and carry the coil. That shaft though, has to carry all the weight of the ship, and it's got to have a motor, a huge electric motor driving it. Put 'em on the same shaft to minimize stresses and gearing and

complexities. The motor? Well, our gravitic rotor has to spin fastest out in interplanetary space where the lines of force are weaker, further apart, so we want a variable speed motor. Say a D. C. series wound job, of about 40,000 horsepower. Some atomic generators to supply it and some gyroscopes to stabilize the ship against the thrust of the big motor.

It's taking shape now. A sphere shape will be most efficient. The huge drive shaft and motors in the center, the load distributed so it falls "below" the lift thrust of the gravitic rotor. That means heavy cargo rooms, the motor, generators and gyros down below. But the giant rotor shaft carrying all the stress, will have to have huge thrust bearings, probably the big oil flotation type, with copper-cadmium or copper-silver-bronze bearings.

We'll put the crew up at the top, in among the queer-shaped little rooms near the top of the bulge, where they can listen to the "voices" muttering down the great stringers and cross beams distributing the thrust of the rotor. Put the passengers in between top and bottom, keep 'em out of the way, and you have the *S. S. Arachne*, first of the spider-fleet—may their tribe increase!

But troubles, new troubles with new machines. A crack in that giant drive rotor out between the worlds, where the shifting, weaving, invisible lines of force thin out.

So my ship and her problems. So my Skipper Parsons, and Chief Engineer Josh McNab. They're the real characters I've fooled around with in some 18 years. I hope you'll like them!

Arthur J. Burks

Casey's Uranians.

Dear Mr. Campbell:

I have never been one to shudder when an author used speeds far surpassing the speed of light for his rockets, and so I was interested to notice the other day that Einstein has suggested that there may be an "ether" all around us. Light travels through this "ether" 186,000 miles per second, but when an object is moved the "ether" compresses it. Thus the length of a yardstick would be reduced to zero were it to attain the speed of light. By using hydrogen atoms as a "clock" and shooting them through a vacuum it has now been proved that a moving

clock keeps slower time than a stationary clock. If this theory of etheric "compression" is proved conclusively, your authors will have to throttle their spaceships down a trifle.

Kent Casey's "Starcie" was interesting, but he fails to account for the fact that Uranus has an atmosphere made up almost entirely of methane and ammonia, and that the temperature is about 100 degrees Centigrade. Would such a world produce life as much like ours as Casey implied? —Charles Jarvis, 10 Avenue Petain, Shanghai, China.

Evolution and Light.

Dear Mr. Campbell:

And with that standardized heading, I commence. Mr. Cummins, are you not wrong in assuming that, in a million years or so, mankind will be a race of giants? Even though man has been increasing in size for the last five hundred years, there must be some limit, it seems to me, on the size an intelligent, mobile being could possess. The limit would be a factor of the speed with which neural impulses travel from the sensory organs to the brain. If it took too long for a being to react to a situation, that being would not be efficient enough to survive.

To return to the future evolution of man — Mr. Swisher raises an interesting point when he suggests that all the work that goes on with x-rays and radioactive radiations may produce an effect on man's evolution within the next hundred years. But wouldn't that effect appear in the children—oh, oh, pardon me! Mr. Swisher does say in his letter that the effect may not show for several generations. Sorry.

The "Bunte-Hayden-Dirac" theory went over my head, I'm afraid. But it sounded good, except that Mr. Hayden didn't explain how the fact that the force of gravity varies inversely as the distance would fit into his theory. Or maybe he did, and I missed it. But let's hear more of the "Bunte-Hayden-Dirac" theory, Mr. Hayden.

And now to get my nickel's worth in on this argument about the effects produced by a luminous body traveling faster than the speed of light. According to Einstein—and my own interpretation, I suppose—bodies can not travel faster than the speed of light. So that is that.

But, supposing it did. Then, of course, its speed would be faster than the speed of light only in relation to the observer.

Einstein says—I hope—that light travels at a constant speed, out in space, and that no other velocity can equal or be greater than that speed. Also, the speed of light is the only constant. The time and space units in the equation vary with respect to one another, as the speed of the moving object approaches the velocity of light.

So, as far as the luminous body was concerned, light would travel at its usual speed with regard to the luminous body. With regard to us, the luminous body, traveling in relation to us with a speed greater than that of light, would seem to have a negative length, and time would be going backward! Or am I just suffering from a hang-over? Perhaps I'd better drop the subject.

But if Mr. Tarr desires, I'll dig up the formulas known as, I believe, the "Lorentz Transformation" and see what I can do with them. You know, if in a system "K" an object is moving with a certain velocity along co-ordinate "X", what would be its velocity in a system "K-Prime"—or something.

I hope that some one who knows what it is all about doesn't jump into "Science Discussions" and land on me with both feet. But I suppose I deserve it.

But I'm trying—gosh! How I am trying! A word must be said about Mr. McEckron's letter and its vocabulary. But words fail me, and I pass on, pausing only to say that I hope he writes again.

I see that Mr. Wooding and Mr. Hilt also have words to say about the luminous body moving faster than light. I think I'll retire, and leave the field to their more capable hands —Allan Ingvold Benson, Box 17, U. S. S. California, San Pedro, California.

BRASS TACKS

Wellman's been liked more and more recently.

Dear Mr. Campbell:

Congratulations!—for two of the finest novellettes I have read in many years. "Seeds of the Dusk" is a corkingly well-written first place winner. "Men Against the Stars" close second. I didn't think M. W. Wellman was capable of such a story after his previous one in Astounding.

I haven't read anything else but I just couldn't wait till I'd finished the entire copy.

Again congratulations! Keep it up.—J. Mason, 33 McLean Blvd., Toronto, Ont., Canada.

How do you rate them?

Dear Sir:

I have been an ardent reader of Astounding Science-Fiction since 1935, and I think it's the best magazine on the market. The best story you ever published was, in my opinion, "The Mad Moon." Weinbaum was a genius and I want reprints by him. Please make Brass Tacks bigger and print less Science Discussions. They make me have a headache.

Keep Wesso on the covers, and Dold and Marchioni on the insides. Thomson is your worst illustrator. Let's not have any more by him.

Here is a rough scale of your authors:

E. E. Smith.....	90%
Jack Williamson.....	90%
Eando Binder.....	82 1/2 %
Stanton A. Coblentz.....	80%
Nat Schachner.....	80%
Don A. Stuart.....	75%
R. R. Winterbotham.....	70%
Eric Frank Russell.....	70%
John Russell Fearn.....	70%
Manly Wade Wellman.....	60%
Warner Van Lorne.....	60%
Arthur J. Burks.....	55%
J. Harvey Haggard.....	52 1/2 %

Stories by any of these authors will be welcomed. If this letter is printed, I should like correspondence with any boy 15-16 interested in science-fiction —F. D. Wilson, 16 Pinkington Rd., Southport, Lancs., England.

Concerning Letters.

Dear Editor:

May I politely suggest that James Avery of Skowhegan, Maine, commence walking east and not hesitate when he reaches the shore?

Is brother Avery indifferent to the entertaining but unpaid authors surrounding him, or is he just sour because his name lost the election? His complaint in the June issue that enjoyable, entertaining letters no longer appear in readers' columns is slightly damp. That same June issue contains some wonderful examples.

I will admit that the old "gang" have gone —apparently—for who reads letters from Pritchard, Hornig, Lutwin, Schwartz, Wolfheim and that California creature, Ackerman, nowadays? Perhaps it is that they occupy positions that curtail the writing of letters to Brass Tacks.

Nevertheless, Mr. Avery needs but to look around his own letter mentioned. Reread the one from A. S. McEckron of Galva, Kan. That letter approaches the pinnacle of brilliant and

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COLOR OF EYES..... COLOR OF HAIR..... COMPLEXION.....

non-offending sarcastic wit and humor, displays remarkable human insight and shows an admirable talent of word arranging. The McEckron letter should have lead off in Brass Tacks instead of almost ending Science Discussions.

And look over again some of the enjoyable phrases, sentences and paragraphs in some of the others. I am writing this by the flickering flame of my wee tallow dip in flood bound Los Angeles. "Science is wonderful when it works!" and the same gentleman's experiences with his letters and his honorable name being cast about the world as if they were commercial commodities. "This past issue was O. K., except for that misht of a child's nightmare known as "Jason Sows Again." I never did care much for Burks anyhow. I've read him in other magazines and he doesn't agree with my metabolism"; and so on down the column.

If letters such as the June issue contained don't please Mr. Avery, I admit that I am at a loss to know what to do about it. If the magazine started paying five dollars per letter, the boys of the government Writers' Project might be able to turn out a few to please him. My friend Avery himself didn't do so bad at writing. It was interesting, if not enjoyable. But perhaps he would prefer this kind, which is of the "type once printed in the old ** Storrs":

deAR ed:Tor

I think yer book is lousy and I want my mouie back the stories are punk and they ain't even good stories yer wholed mag. is punk awful. I dare yew to print this!

If that is the type of letter the Maine gentleman craves, he will have to go back to the magazine he mentioned, for I have yet to see such a letter in the modern Astounding and I did see such a letter (almost a word for word copy) as is given above in the very magazine he yearned for. Bob Tucker, 218 E. Monroe St., Bloomington, Ill.

Maybe he doesn't like Schachner.

Dear Editor,

Whether or not a science fiction magazine is improving, declining, or remaining at the same level, there usually appears each year an issue that can in most phases be termed excellent. Don't misunderstand me, there are a good many excellent issues of Astounding throughout the year, but after all there is likely to be one that in all angles dominates the others. The June Astounding already has the honors for this year. Unless Editor Campbell turns superhuman before the next six months have passed, I am sure this same June issue won't be excelled until Santa Claus has dropped around again.

The cover and its "Story" were both good. I hope you use Saturn on the next astronomical cover. It wouldn't be hard to do, you know; Schachner, Gallun or one of your other office boys could dash off a little yarn about the ringed world in just a few minutes. (All linotyped, too!)

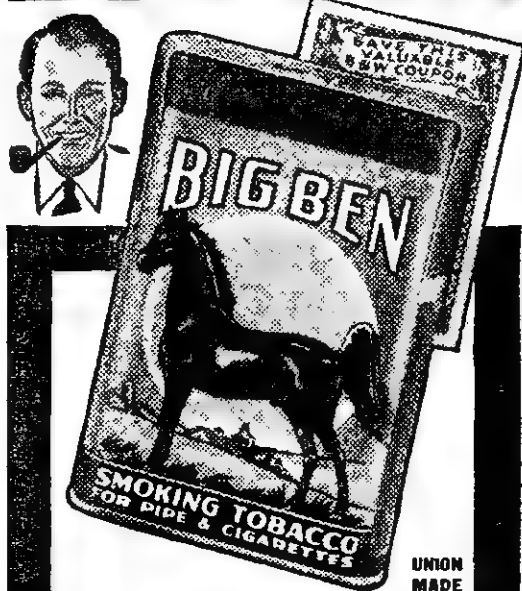
Norman L. Knight's story possessed the magnitude of "Frontier of the Unknown", despite its brevity. By all means, secure more from this author.

"Men Against the Stars" is the best in the issue, though I believe Wellman could have made a powerful novel out of the idea. Sequel here, please.

After reading a heap of garbage called "Last Earthman" two months ago, I hastily removed Raymond Z. Gallun's name from my list of favorite science fiction writers. I reached the conclusion that he had moved in with Schachner and was borrowing Nat's linotyper quite frequently. I even began to wonder if friend RZG had a two-year-old brother. Fortunately, however, Gallun returned just in time to convince me that he still had traces of "Old Faithful" in him. In fact "Seeds of the Duck" is his best story since "Old Faithful." I see his name on next month's schedule. Let's hope the coming yarn is as good as "Seeds of the Duck".

I'm afraid Jack Williamson has caught Schachneritis, too. "The Legion of Time" is a miserable failure when placed next to Williamson's first masterpiece, "The Legion of Space." The new serial is nothing but tripe. He must have written it while striking a match.

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Lastly, congrats to Wesso on his magnificent drawing of Mrs. John Chapman, 1521 Como Ave. S. E., Minneapolis, Minn.

"'Three Thousand Years' was great!"

Dear Mr. Campbell:

Three issues have come out since I last wrote, so I'm a little behind the times; but I'll see what can be done to catch up.

"Three Thousand Years", of course, deserves comment first, and, as far as I'm concerned, favorable comment. It was an excellent story, both from the standpoint of the characterizations and the incidental science—a good example of the latter being the episode of the vault opening by the glassmen. And the description of Gumbie's "perfect civilization"! That was a real laugh. McClary's style is far better than the average, and he deals with the human element, and the reactions of people to their environment, in a way that I have seldom seen surpassed. He produced not only a science-fiction yarn, but a piece of real literature. More!

I'd like to comment on all the stories, but I'm afraid the postage for the resultant ms. would require postage beyond my present means. However, a few need something said about them. For instance, Manly Wade Wellman's "Mea Against the Stars". There was realism mixed in with an understanding of the spirit of exploration, the outward drive in man whatever it is, and the ability to tell a fast moving yarn. The mixture producing a story that led for first place in the issue. The other top notcher was "Below Absolute", which treated a not altogether new idea in a novel manner. However, this "negative space" business is in danger of becoming overworked; it has been used quite a bit of late. It might be a good idea to give it a rest. Another good tale was "Seeds of the Dust". The idea of an organism being able to develop a science by introspection is a new one to me, and it was presented most convincingly here. Galun seems to be a consistently good writer.

I wish the same could be said of Wesso as an artist. He did good work on the June cover—in fact, it was the best one since March. And his interior work was an immense improvement over that of the past few issues, especially the illustration for Wellman's story. Schneeman did a good illustration—the second one for "The Legion of Time". And apropos Schneeman, let's have more of his cover illustrations; the one for the May number was fine. I have one fault to find with Binder: his drawings are too obviously sketches. That is, he leaves too much white, unshaded space in his work. As for Brown—please continue his efforts to the cover, he does very well there.

Speaking of illustrations, it seems to me that the drawing or picture accompanying the story has a great influence on the impression which that story leaves in the reader's mind. I have read yarns that impressed me greatly, and yet, after analyzing them closely, I have decided that the illustrations in each instance imaginative and well executed, have been just as responsible for the effect. It was the *realization* of the spirit of the story that did it—the visible presentation of the writer's idea. And, conversely, rotten illustrations have spoiled perfectly good stories for me. Perhaps the reason that Dold is well liked is that, although his technique is none too good, his imagination and his ability to sense the effect which the author wished to produce enable him to produce appropriate drawings. And that's one reason I don't like Thompson's work—he apparently has no great imagination.

Mr. Avery wonders if the readers are in favor of the new regime. Indeed, he appears quite skeptical. "Who asked for the mutants?" says he. "Why don't we see the type of letters they need to write in the good of days?" (Wonder if it could possibly be that not so many of them are written?) Well, Mr. Avery, suppose our editor had asked the readers, "Do you want mutants?" How many readers would know what he was talking about? He would have to show them, and he did, and I, for one, am satisfied. And I dare say that if the majority

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of fans kick, he'll do away with them—but I'll bet they won't. Dictator? What's your definition of a democracy? Ralph C. Hamilton, 920 College Ave., Wooster, Ohio.

"'Three Thousand Years' was a mess!"

Dear Mr. Campbell:

Just a line of congratulations for "The Legion of Time". It starts off like a great tale. Williamson is again hitting the peak he reached with "The Legion of Space" and "The Conquerors".

Sorry I can't say the same for McClary's opus. It's a dull mess. Your new authors are trying to be funny. Peterson is good, but Casey and Schere are pathetic.

For the April issue, orchids to Sprague de Camp and Lester del Rey. A big bouquet to Brown, your best cover artist. Good luck to you in further mutations.—Frederick Morgan, 39 West 11th St., New York City.

Astounding was shifted back in the month because growth required that it be shipped with a larger group of Street & Smith magazines.

Dear Mr. Campbell:

Had not Astounding come out the day it did this letter would have been a far cry from that you would have received. And who wouldn't begin to wonder with Astounding over a week past the "deadline"? I still wonder why it was so late in reaching the newstands.

"Three Thousand Years" was a big disappointment. It started out fine—original—but ended up little more than a carbon copy of "Rebirth". With due respect for T. C. McClary (and realizing that even authors can use a little cash now and then) how did you let that one get by, Mr. Campbell?

On the other hand "The Legion of Time" exceeds even the advance notices you gave it. Place this one first on your Analytical Laboratory.

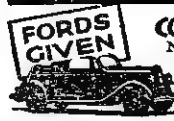
I must say I appreciate the science articles you give us. "The Great Eye" and "Witnesses of the Past" were both excellent, informative reading. Let's have more like them. But where was E. E. Smith's scheduled article?

Of course we want fantasies like "Wings of the Storm". They are a pleasant diversion from the highly involved "x-y-z-ab" who cares? type of science fiction we readers have been forced to swallow of late. However, stories like "Isle of the Golden Swarm" have no place in Astounding. They are distinctly not science-fiction, fantasy or otherwise—even conceding their merit.

Best stories of the month: Discounting

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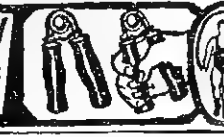
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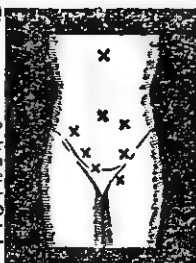
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"Legion of Time," which is, of course, first. "Philosophers of Stone" comes second. It was unique—the author, D. L. James, has really let his imagination roam. That is the type we want more of. Then—"Seeds of the Dusk" followed very closely by "Men Against the Stars." They were all excellent, so when I say "Below. Absolute" was last in merit, it means merely that it was less excellent than the rest.

And the cover? Let me shake your hand via the postal ways. Now, how about a cover, showing for all time, Earth as seen from the Moon (Ten to one odds, the North and South America are the continents in the foreground)? Wesso's illustration for "Men Against the Stars" was the best I've seen since the last poor issue of Astounding. And Jack Binder improves with each month. Mark Reinberg, 430 Surf St., Chicago, Ill.

"Less science articles."

Dear Mr. Campbell:

I don't write fan letters to movie stars. Nor to radio idols. Nor to magazines. But ---!

I find myself breaking out with a deep crimson rash after reading the letter from a gentleman in Skowhegan, Maine, in the June issue of Astounding. Maybe I'm allergic to criticism of the things I happen to like, but Mr. Avery's diatribe gets me down.

"Good old days of '34 and '37!" When the unlamented Hawk Carse chased lither and yon through the universe in search of the arch fiend, Whoozis, and ended up nowhere. And that was the best that the mag had to offer.

More power to Wesso. His "mutant" covers are swell. And the art work on the inside of the magazine has been steadily improving, the past few months.

Leave Brass Tacks and Science Discussions where it is, and as it is. What if it is stuck away among the ads? I'd rather have it there, than to have to turn to the ads to finish the story I am reading. I'm naturally lazy, I reckon. I like to finish a story in one piece, not hunt around among the ads and legends of other stories for the rest of it. When I've finished all the yarns in the book, then I read what the other fellow thinks about the preceding issue. And, stealing in-judiciously into my subconscious, come the ads. I hate 'em, too, Mr. Avery, but I read them, just the same, somehow.

Oh, yeah. A gentle slam, Mr. Editor. Don't you think that ten science articles are a bit too much? If I had my way, they would be condensed to a quarter page, and stuck in as filler at the end of a story. (As on page 96, June issue.)

I should like to cast my ballot with those who enjoyed "Jason Sows Again." I thought it was just about tops. But then, this author always rings the bell with me. "Three Thousand Years" was more than O. K. "Hyperpilotite," an exceptionally good yarn. "Is't Earthman," well-written and interesting. "The Faithful" hm!—only fair.

In the June issue, the story I liked best was "The Legion of Time" by Jack Williamson. Certainly a new departure from the hack worn, run-of-the-mill time stories. Second best, Manly Wade Wellman's "Men Against the Stars." Wellman is always good. Third choice, "Three Thousand Years." Swiftest ending of an excellent serial. Fourth choice, Knight's "Isle of the Golden Swarm." I enjoyed this story as much as any of the others, but if it must be cataloged, I guess I'd rate it fourth. Fifth, Gallin's really outstanding novelette, "Seeds of the Dusk." The base of the story, plant invasion from Mars, is almost identical with a story by Clark Ashton Smith, which appeared in another magazine several years ago. However, Gallin's treatment of this story-idea makes it entirely his own. Nice going, Ray. I didn't like "Below Absolute." But then, I didn't care for "Queksilver, Unlabeled" either. "Philosophers of Stone." Hm! Not so hot. Story ideas, unlike liquors, do not improve with age. File this story in the cheese section, labeled "Very Old."

Now for my squawk. Why can't we have some Penton & Blake stories in Astounding, Mr. Campbell? Have the "thushol" got 'em, or what? Maybe Editor Campbell is bashful about printing Author Campbell's stories in his magazine. Or sumpin'.

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In conclusion: an orchid to the present regime of Astounding, and an artichoke to chronic kickers. We've got a doggone good mag, let's keep it that way.—Russell Morris Wood, 1055 Bayview Avenue, Wilmington, Calif.

Mrs. Ley illustrated "Witnesses of the Past".

Dear Mr. Campbell,

Time has rolled on, and lo and behold, it is time for my monthly letter.

First, a few general remarks. I was exceedingly pleased with the cover of the June issue and earnestly hope that this mutant type will become increasingly frequent as time goes on. There's only one minor criticism I would like to make and that is this: don't you think that it would have been rather more realistic had Mars been shown in some phase other than full? A gibbous Mars with the shaded portion just barely seen against the dark background would have been much more startling and effective.

I would also like to make my suggestion for the next mutant cover. (Everybody seems to be advising you on that point, so I may as well contribute my two cents.) It is generally conceded by one and all that the most beautiful object in the Solar System is Saturn, and consequently it would seem that a cover showing the famous rings as seen from Saturn's surface would be quite distinctive.

And now about the stories. There seems to be a dearth of the longer stories. Your "novellettes" are often only a page or two longer than the short stories. This is unfortunate as the long complete story fills an indispensable cavity in the scheme of things. Its length permits the development in more complete detail of the plot and it has none of the elements of discontinuity which mark the serial.

I think it would be quite easy for you to give us two thirty-page novelettes each month if you would give us only one serial at a time. Furthermore, one science article is quite enough, and the ten pages thus saved could quite profitably be turned to fictional uses.

And now for my ratings for the June issue—intended specifically for use in the "Analytical Laboratory".

1—"Legion of Time" (Second Installment) by Jack Williamson. I cannot deny that there has been a distinct let-down in this installment, which in a measure disappointed me. The scenes of gory bloodshed I consider quite unnecessary. However, I overlook that fault in view of the general excellence of the plot and of the story (thus far) as a whole.

2—"Isle of the Golden Swarm" by Norman L. Knight. I could scarcely believe that this fast-moving, clearly-written, interesting tale was written by the same author who wrote "Frontier of the Unknown". The latter was boring and long-winded in the extreme.

3—"Philosophers of Stone" by D. L. James. The idea behind the plot is what got me in this one. A world of protoplasm ruled by inorganic crystals is novel, to say the least.

4—"Witnesses of the Past" by Willy Ley. At last we have a science article based on biology. I believe that this is the first one of this type ever to appear in our magazine. Let's have more if you please. The illustrations for the article were excellent. Who drew them?

5—"Below—Absolute" by Harry Walton. Not outstanding but satisfactory.

Neither of the two novelettes was anything to brag about, but I would like to congratulate Mr. Wellman on the poem which appears on pages 14 and 15. It was a good deal better than the story itself.

Lastly, I would like to array myself against what will probably be an overwhelming majority and proclaim from the housetops that I think "Three Thousand Years" unfit to print. It is not the worst serial I ever read, but it certainly is the worst that ever appeared in Astounding. Just to show you what I mean, the rating the June issue received (averaging the ratings of the individual stories weighted according to length) is 85% if "Three Thousand Years" is ignored, but only a bare 57% if it is included.—Isaac Asimov, 174 Windear Place, Brooklyn, N. Y.

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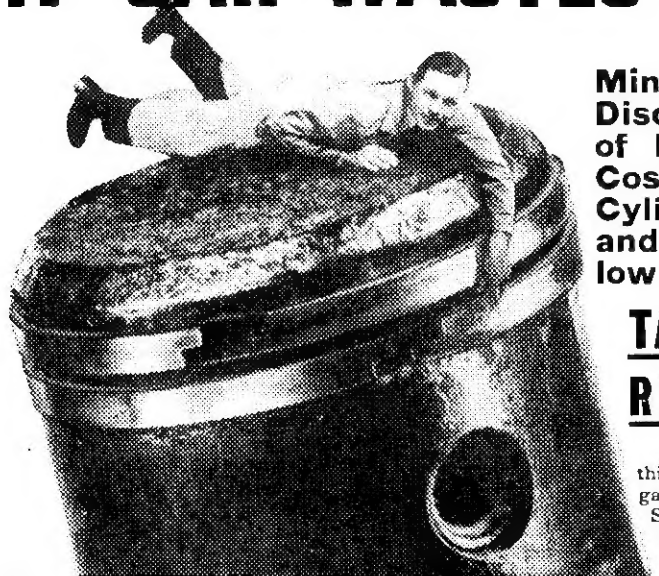
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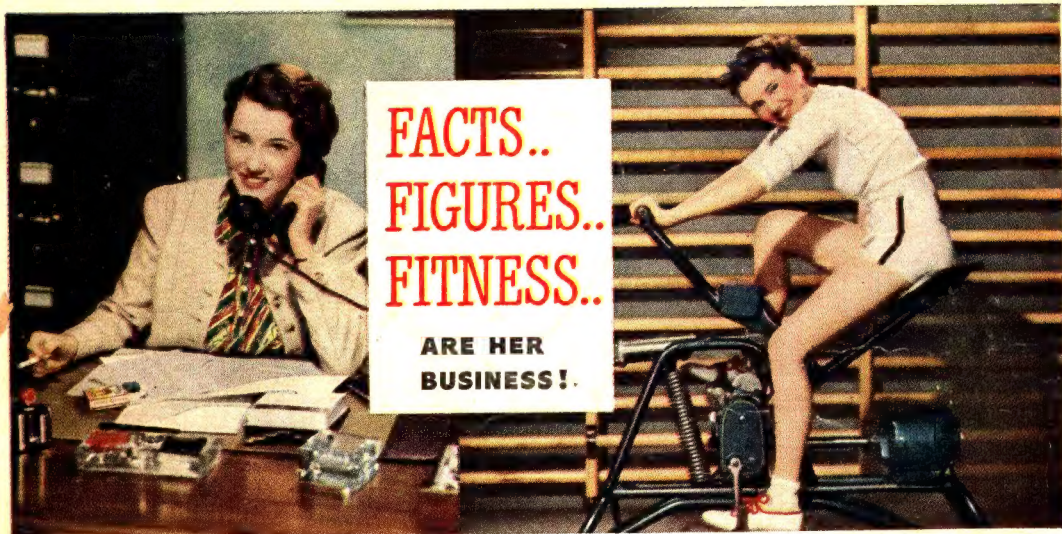
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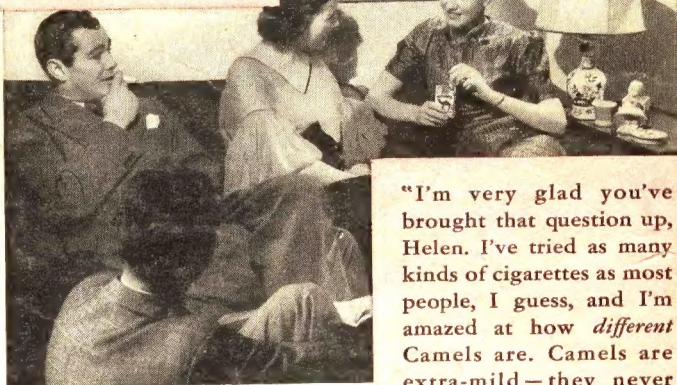
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A matchless blend of finer, MORE EXPENSIVE TOBACCOS—Turkish and Domestic

PEOPLE DO APPRECIATE THE COSTLIER TOBACCOS IN CAMELS

THEY ARE THE LARGEST-SELLING CIGARETTE IN AMERICA

ONE SMOKER TELLS ANOTHER **"CAMELS AGREE WITH ME!"**